# Telephony

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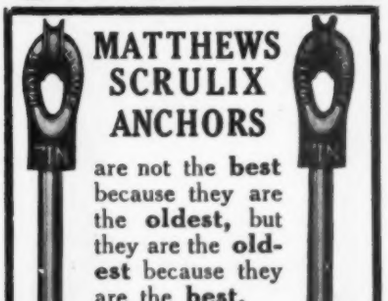

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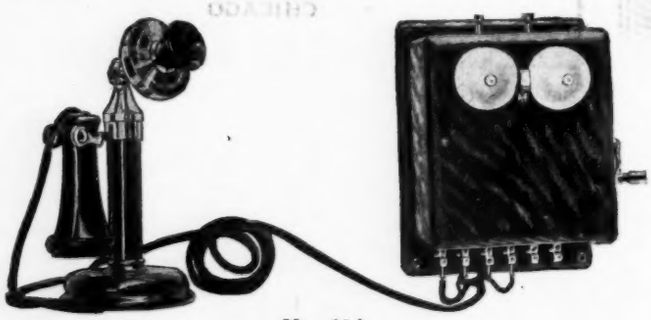

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## By the Way—

Did you read last week of the proposal of the railroad brotherhoods for government ownership of the railroads?

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Under the so-called Plumb plan, we are assured that "the public can obtain the money to purchase the lines at 4 per cent, whereas the public is now charged rates to guarantee the roads 6½ per cent on their money."

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Fine, we're for that! But where would "the public" obtain money at 4 per cent to purchase the lines?

It would have to be from itself. In other words, the government would have to issue bonds at 4 per cent in exchange for 18 or 20 billions of outstanding railway securities, and whenever money was wanted to operate or to build extensions, more bonds would have to be put out.

The war debt is $25,000,000,000—spent for national defense. Would the American people authorize the spending of about $20,000,000,000 for an adventure in government ownership? Would you loan your money to the government at 4 per cent for that purpose? Think it over.

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## The Farmer Subscriber.

Managers of telephone companies who are meeting opposition from farmer subscribers in the matter of increased rates, should read a report of the federal Department of Agriculture, which came out recently as a part of the government's inquiry into the high cost of living.

This report shows that the farmer today is getting for his crops (all taken and averaged) three times what he did during the 43-year period from 1866 to 1908. We all know that ever since the war began in 1914, farm products have soared in price and that the farmer has profited to a greater extent than any other class in the country.

No sensible person will resent this good fortune of the tiller of the soil, for we all realize that agriculture is the basis of real prosperity, but we also know that the farmer is usually the loudest and most determined kicker when called upon to pay a reasonable charge for telephone service.

The figures given by the government report are astonishing and worth repeating. The department took the prices received by the farmer for wheat, corn, rye, oats, barley, buckwheat, potatoes, hay, flax and cotton, for 1866, when the first records were made, up to and including 1908. A grand average on all prices for the entire war period taken as a base figure for 100 per cent. Using this base and averaging the crops year by year from 1914 to date shows how the price of farm products has increased:

| | |
|---|---|
| 1914.....137 | 1917.....289 |
| 1915.....139 | 1918.....272 |
| 1916.....144 | 1919.....310 |

This table, then, shows that the farmer is receiving for his products this year more than three times what he averaged in the past. The telephone man who has been forced by rising costs to ask for a higher rate has no doubt met strong opposition from his subscribers in rural districts. Rate-fixing commissions usually lend a willing ear to the farmers for they are a strong political factor.

The fact remains, however, that both the telephone company and the commission have, in these statistics, a strong argument with which to meet the farmers' protest. That is the reason they are presented herewith. It should not be overlooked, either, that these statistics emanate from a source not only authoritative but unprejudiced—the federal government.

If your farmer subscriber howls about a modest raise in telephone rates, pull these figures on him. If he is inclined to be half-way fair, he will grin and accept the increase.

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## A Telephone Tie.

Of more than ordinary interest is the news that by the end of this year there will be direct telephone service between the United States and Cuba. The first link is to be a submarine cable from Key West to Havana, which, it is said, will be the longest telephone cable of its kind in the world, the next longest being the cable across the English Channel, connecting England and France.

The line from Florida to Cuba will be the first step in linking the islands known as the Greater Antilles to the American continent. Daily telephone communications between Cuba and the United States will help greatly in strengthening the ties of sympathy and co-operation between the two republics, which were formed back in 1898. We must not forget it was our desire to help Cuba that started the Spanish-American War.

# Prompt Answering to Line Signals

## What Are Essentials to Be Considered in Prompt Answering to Subscribers' Line Signals? In This Article Are Presented Principles of Traffic Handling Which Apply to Common Battery and Magneto Telephone Exchanges

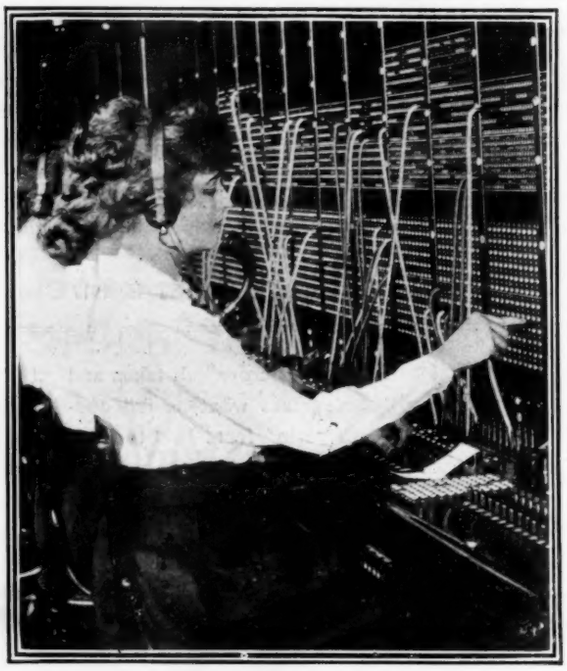
By Harry E. Eldridge

*Traffic Supervisor, Chicago Telephone Co.*

Nothing gives a subscriber so favorable an impression about his local telephone service as a prompt and courteous answer by the operator.

The importance of using the right tone of voice has been repeatedly emphasized; too much cannot be said about this and, as you have heard so often, "An operator must depend partly on her tone of voice for the impression which a subscriber gets about her and her work." Gestures and facial expressions—on which we all rely in a face to face conversation—are, of course, out of the question over the telephone. That is one of the reasons why an operator's tone of voice should be pleasant and why she should cultivate "the voice with the smile."

Having developed the proper tone of voice, we are then confronted with the necessity for speed.



"An Effort Should Be Made in Answering Calls to Use the Cord Nearest the Light Which Is to Be Answered."

One of the first things to consider in connection with the matter of giving a prompt answer is whether or not the subscriber's line answering jacks are properly distributed over the switchboard so that the position loads will be as evenly balanced as possible. If lines are not so arranged, they should be.

In balancing the loads at the switchboard many different methods have been used, among which are the following:

(1) Counting calls originating in (a) panels, (b) positions, or (c) sections of switchboards. The load as affected by the work of individual operators, must be taken into consideration if total calls *handled* in a position are counted, *rather than* the *calls originating* in the position; also distinction should be made between calls originating at primary answering jacks and those at overflow or ancillary answering jacks.

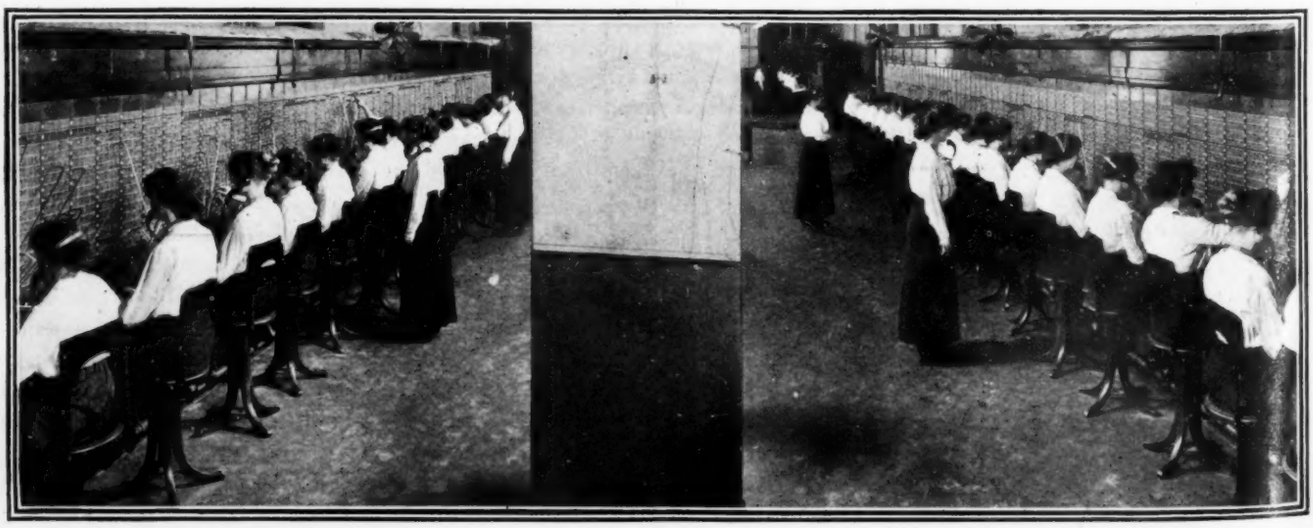
(2) Taking a plug count of cords up in the answering jacks of subscribers' lines—excluding, of course, those which are up in secondary answering jacks. With this information at hand, a jumper list can be made up and lines moved as necessary.

(3) An arrangement whereby each panel or position will have approximately the same number of lines of all the various classes of service, thus permitting an even flow of traffic.

The second point which must receive particular attention is that of providing a proper operating schedule based on the various factors which have a bearing on the subject, particularly the amount of traffic of the various classes, the experience of the operators and the "spread of lines."

The greater the number of positions occupied, of course, the greater the team work, and the more positions in which there are working lines. But where operators are *not* working, the greater the reach necessary the less teamwork there can be—which means lower loads per operator.

It is a well-known fact that operators work best when they are busy—and the busier they are, the better they work up to a certain point. No operator should be over-loaded, nor should she be underloaded, for this has an injurious effect



"No Two Operators Are Entirely Alike and a Supervisor or Chief Operator Must Use Her Knowledge of Human Nature to Get the Best Results From Individuals"—She Must Show Keen Interest in the Quality of Service Being Furnished.

on her ability to handle a proper load.

When the traffic falls off, positions should be vacated so that there will so far as possible be just the right force. Usually some employe will be glad of a chance to be excused early or at such light periods; special instruction work—individual and otherwise—can be given; also local operators can learn toll, "B" work, information, etc.

A chief operator or supervisor must use judgment in arranging her force at the board and unless it cannot be avoided, two or more poor operators or students should not be sitting in consecutive positions. The student needs encouragement and should be trained to develop accuracy before speed.

At a magneto exchange an operator should form the habit of restoring each drop as she answers the corresponding line. This will also tend to free adjacent operators from any uneasiness as to whether or not that line has been answered.

At a common battery exchange, after the position loads at the switchboard have been properly balanced and a proper operating schedule provided, it is strictly up to the supervisory and operating forces to give satisfactory service, whether answering or some other feature. It will not take even the best operators long to slow up or become lax in their operating if those supervising their work do not show a keen interest in the quality of the service being furnished.

The answering, like other features of the service, will be *as good as the supervisors make it.* The right executive and proper supervision are just as essential to successful work in giving good telephone service as in any other line of business.

Any operator *knows how* to handle a call properly and to answer calls quickly. The chief operator's—and supervisor's—job is to see that each individual operator is interested enough so that she will want to put her own calls through as promptly and accurately as possible.

A group of average operators working under the direction of a good live supervisor, who knows her business, will as a rule, give a better grade of service than high class operators who work under improper supervision. The personality of a chief operator usually is reflected in the efforts and attitude of her supervisory and operating forces; likewise a supervisor can influence her operators to become speedy and accurate, or slow and careless.

When a customer goes in a store, he often expects to wait a short time before he receives attention, and is willing to wait if he sees that all clerks are busy; but over the telephone any subscriber may be under the impression that he or she is the only man or woman in town waiting for a telephone connection.

The subscriber cannot see that the operator is busy and as a rule makes no allowance for her being busy. When one is waiting with a receiver in his hand, the delay seems longer than it really is. For this reason, each operator should get into the habit of being wide-awake, making an effort to "go after every call as though it belonged to her and her alone."

Newspapers and magazines are using the term "go-getter" frequently nowadays. A "snappy" operator is a real "go-getter"—she *goes after the calls and gets 'em.*

No two operators are entirely alike and a supervisor or chief operator must use her knowledge of human nature to get the best results from individuals.

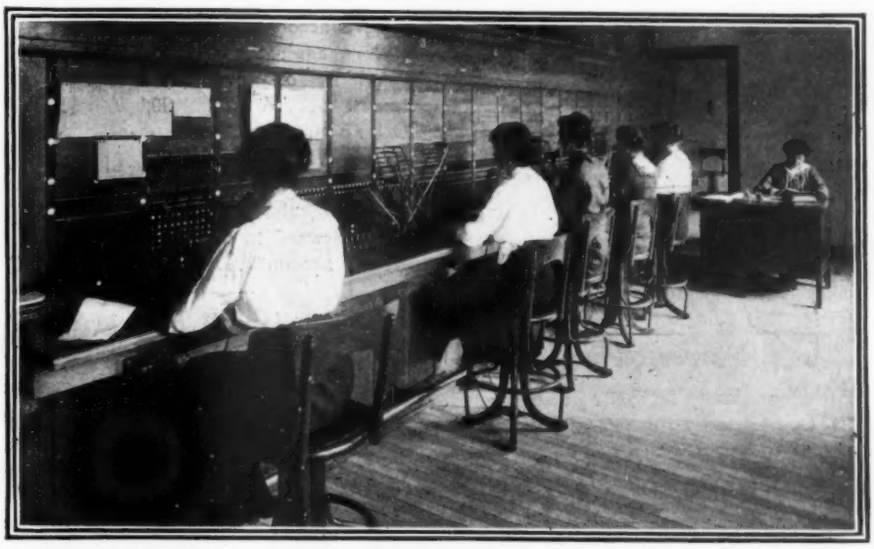
At small offices where there is good feeling among the force, it is sometimes possible to get good results on any desired service feature by a little friendly competition; for instance, plugging in for 15 or 30 minutes with various operators to see who can handle the most connections in a given time without any wrong numbers, cut-offs or doubled connections. (The importance of accuracy must not for a moment be lost sight of.) Proper credit must be given where two or more classes of calls are handled by one operator.

A contest to see which operator can get her cords all up oftenest, will create a surprising burst of speed on the part of the operators who usually travel at a very slow pace.

At offices where "A" operators have access to the subscribers' multiple, the practice of the supervisor calling out numbers to be picked up in the multiple, is one which has been argued pro and con many times. Experience at any office will usually show that this practice, while it cannot be avoided entirely, should be kept to a minimum where there is a full team of operators. It destroys teamwork and has a bad effect on a force.

The noise resulting from calling out numbers confuses operators and where the plan is followed regularly, any speed gained is at the expense of some other feature of the service, especially wrong numbers. Any chief operator skeptical about this statement might ask her best operator what *she* thinks about it.

Frequently an efficient operator who is busy and working adjacent to a vacant position, will be tied up for lack of cords. This condition can be remedied by using two plugs connected by a cord—the same plug as those used on a standard operator's set—and connecting the vacant position to that of the operator who is busy. In this way, she will have cords in two positions to work with.



**"A Chief Operator or Supervisor Must Use Judgment in Arranging Her Force at the Board and Unless It Cannot Be Avoided Two or More Poor Operators or Students Should Not Be Sitting in Consecutive Positions."**

The following points are suggested for the use of chief operators at common battery exchanges:

These suggestions are given as being direct to the local operators. They should be taken up as necessary, from time to time, in connection with regular floor supervision and also might profitably be made the basis of a meeting or talk given to the force on the subject of "Answering," by the chief operator or a supervisor *especially qualified for interesting the operators and getting results from them.*

### Prompt Answering.

*Always try to take the calls in the order in which they appear so that as far as possible the light which has been waiting the longest will be answered first.* Don't answer a line signal if you know another lamp has been waiting longer.

Be on the watch for lights in the positions to the left and right of you as well as in front of you, as proper teamwork

can't fail to improve the service. Face the board—don't look around, or face to one side or the other. If you do, you will not see the signals at once when they come up.

If several lights are burning in front of you and a supervisor calls out one of them to be picked up in the multiple, you yourself should not plug in on the line which has been called out, but should take another one so that some other operator will not find, after reaching up to the multiple, that you have already answered the call. When a number is called out, pick it up quickly.

When you have a "double disconnect" in your position, take advantage of the fact that you can use these cords to answer a new call. This saves time as you have to handle only two cords instead of four.

Avoid half connections; this means "never plug in on a line unless you are ready to answer it." This is annoying to the subscriber and delays the call as it prevents some other operator who might be free—and ready to take the call—from doing so.

When no lights are burning in front of you and adjacent operators are very busy, don't forget to pass a plug to another operator to plug out a light for you in order that you may answer calls which would otherwise be delayed on account of the other operator being busy.

An effort should be made in answering calls to use the cord nearest the light which is to be answered.

Above all, move quickly and show that there is some *life* and *snap* about the way *you* handle calls in *your* position.

## Telephone Service in Shanghai, China—Financial Report.

At the annual general meeting of the Shanghai Mutual Telephone Co., Ltd., of Shanghai, China, held in June, the chairman stated that for 1918 the largest record of a day's messages passing over the company lines was 102,442, a little over 37,000,000 per annum. The number of direct lines had increased from 6,707 in 1918 to 7,493 in 1919.

No new connections have been made at the central exchange since the middle of December, 1918, when notice was issued that no new telephones would be installed in connection with the central switchboard, on account of the congestion of business, until further notice.

The percentage of troubles dealt with on telephones was 0.825 per cent.

The chairman referred at length to the matter of automatic telephone systems, and stated that the automatic service will be tried out on a small scale, with a view to future utilization.

Shortly after this meeting all the Chinese telephone operators struck in sympathy with a national political movement in China, thus minimizing the telephone service available.

The telephone company's working expenses for the year increased by taels 24,364 ($29,602), while the receipts for the same year showed an increase of taels 52,850 ($64,212). Depreciation then increased by taels 19,490 ($23,680) over that of 1917, the items contributing being the North exchange building and switchboard, underground construction and instruments. Assets have increased during the year by taels 162,233 ($197,113). The following appropriations were approved by the board of directors:

| | | |
|---|---|---|
| Shareholders' 4 taels per share ..... | 79,188 | ($96,213) |
| Shareholders' bonus, one and one-half taels per share.... | 29,695 | (36,079) |
| Directors' fees ..... | 5,000 | ($ 6,075) |
| Reserve account ..... | 30,000 | ($36,450) |
| Reserve against possible loss on investments ..... | 20,000 | ($24,300) |
| Debenture sinking fund ..... | 20,484 | ($24,888) |
| Bonus to staff, 10 per cent on salaries.... | 9,353 | ($11,360) |
| Carry forward to next year's account ..... | 28,925 | ($35,144) |

## Central Indiana Owners Meet and Discuss Problems.

More than 100 representatives of Hoosier telephone companies attended the quarterly meeting of the Central Indiana Independent Telephone Owners' Association which was held at Rushville, Ind., on July 22. The main purpose of the meeting was to explain to the representatives a systematic accounting form which has been accepted by the Indiana Public Service Commission.

Problems confronting the telephone owners as a result of the increased cost of operation and growing out of the return of the wires to the owners were also discussed at the meeting.

J. A. Browne, of Winchester, president of the organization, presided at the meeting. John W. Coffey, of the Coffey System & Audit Co., of Indianapolis, conducted a plant accounting school and explained to the members the proper way of keeping books. Harry Boggs, chief accountant for the Indiana Public Service Commission, had charge of the accounting school for Class C and D companies.

## Chili Telephone Co., Ltd., Reports Steady Growth.

The Chili Telephone Co., Ltd., of Chili, S. A., reports a steadily increasing demand for service facilities, despite the depression in the nitrate industry since the cessation of hostilities. The company has been called upon to establish new exchanges, build new trunk lines and install the most modern and efficient equipment and apparatus.

During the past year it has built 35 new trunk lines, opened six new offices, and in four important districts—Santiago, Concepcion, Iquique and Rancagua—had acquired its own premises. The mileage in operation was increased by some 1,425 miles, while the number of subscribers rose to 16,751, a gain of 1,331, or nearly 9 per cent—a record increase. It has completed the new building at Valparaiso and is now occupied in getting everything ready there for the installation of the automatic plant in course of manufacture.

In regard to its concessions, under Chilean law a term of 20 years was fixed for underground cables and ten years for aerial wires. The company had already underground concessions at Santiago and Valparaiso, and has recently obtained permission to change its overhead wires to underground at Concepcion, Talca and Vina-del-Mar. Its aerial concessions will shortly expire, and negotiations with the government for their renewal have advanced satisfactorily.

A new and important concession for the construction and operation of a telephone system in the Antofagasta and Calama districts was granted last year, and the company is now engaged upon the preliminary work in connection with the introduction of its service in that part of the country.

The gross revenue showed the substantial increase of £22,962 ($114,810), but owing to the greatly increased cost of labor and materials, the expenditure increased by £24,766 ($123,830), thus resulting in a net decrease in revenue compared with last year of £1,804 ($9,020). The percentage of expenditure on revenue rose from 59.6 to 64.7, an increase of 5 per cent.

## Trial Conducted by Telephone at Columbus, Ind.

The telephone was used to good advantage in the conduct of a trial at Columbus, Ind., last week. Dewey Mails, of Columbus, was arrested in Seymour for failing to have a license plate on his motorcycle. Joseph Swope, mayor of Seymour, ordered a warrant for his arrest and sent it to the authorities at Columbus. Mails was taken to the Columbus police station where an officer from Seymour was waiting to take him back for trial.

As he was a resident of Columbus, the officials called the mayor of Seymour over the telephone, and after the circumstances were explained the trial was conducted by telephone. Mails pleaded guilty at the Columbus end of the line and Mayor Swope said "$1 and costs" at the other end. Mails paid the fine and the telephone bill and was released.

# Telegraph-Telephone Development

## Report of Development Committee of the Telegraph and Telephone Division, American Railroad Association, at Convention of Railway Telegraph Superintendents, Tells of New Apparatus and Equipment Now in Use

At the annual meeting of the Association of Railway Telegraph Superintendents in Chicago in June a most interesting report on telegraph and telephone development was presented by the committee through J. A. Jones, superintendent of telegraph, Southern Railroad, Lines East, its chairman.

At this meeting the association, which has been in existence many years, was disbanded, and its members taken into the membership of the American Railroad Association as the Telegraph and Telephone Division.

As the report on the development of the telegraph and telephone has so much of interest to telephone men, it is published in full.

### Telegraph Operation.

There has been practically no new development in telegraph operation during the past two years. Progress has consisted mostly in the further application of automatic apparatus, particularly multiplex printing telegraph apparatus.

As indicating the extension of the use of automatic apparatus, on December 31, 1918, there were in the Western Union Telegraph Co.'s service, 210 multiplex printing telegraph circuits operating on approximately 121,500 miles of wire. In addition there were on that date in operation, 88 Morkrum printing telegraph circuits on approximately 33,800 miles of wire.

Practically 50 per cent of the total telegraph messages moving over the Western Union wires are now being handled by automatic operation.

### Telegraph Apparatus.

A. Alternating Current Sounder: Considerable improvement has been made during the past year in a type of alternating current sounder which the Western Union Telegraph Co. has been experimenting with. It now seems quite likely that this sounder can shortly be placed in service.

The principle involved in the sounder has also been satisfactorily applied to messenger call circuit units and to certain types of ticker service.

B. Universal Duplex Repeater: Because of the many duplex repeaters formerly in use, and the confusion resulting therefrom, it has been found necessary to develop and standardize a universal duplex repeater. This repeater, as its name indicates, provides for all classes of polar duplex repetition likely to be required in telegraph service.

### Induction.

A. Anti-Noise Sets: An anti-noise set has been developed and tried out experimentally, which practically eliminates disturbances induced in telephone circuits from automatic printing telegraph circuits, provided that the telephone circuits are in good condition as regards balance and transposition.

A more extended use of these anti-noise sets can be made in the future if it is found that telephone circuits are being seriously affected with induction from automatic telegraph circuits.

B. Anti-Induction Equipment. A type of cable having shielded conductors was developed some years ago to reduce the induction between telegraph circuits carried in the same underground or aerial cable. This cable with shielded conductors was expensive to manufacture and install; furthermore it was not quite as flexible as could be desired in connection with the changing of circuit assignments.

Considerable experimental and development work has been done to develop anti-induction equipment which could be installed in the main telegraph office and which would reduce appreciably, induction between telegraph circuits where such circuits are operated duplex. The experimental and research work has resulted in the development of anti-induction equipment which reduces the induction to a considerable extent, and which will make it unnecessary in the future to install shielded conductor cables.

California Railroad Commissison General Order No. 52: During the year there was issued by the California Railroad Commission, the final report of the joint committee of engineers authorized by the commission to conduct an investigation of inductive interference. This joint committee represented power companies, telephone and telegraph companies, railroad companies, and the Railroad Commission of California. This commission has jurisdiction over all public utilities within the state.

The joint committee studied for about five years, both experimentally and theoretically, the causes of inductive interference from high tension power lines and the proper remedial measures for such induction. Its unanimous report was based not only on this technical information, but also upon the economic aspects of the problem and the consideration of the interest of the public in efficient power and communication service.

Included in the committee's report are recommendations for rules governing the construction and operation of power and communication lines for the prevention or mitigation of inductive interference. These rules have been made effective in California by the commission's general order No. 52.

Both power and communication interests, generally, are agreed that this report represents a marked step in advance, and constitutes the best treatment of the subject available to date. It illustrates the importance of the engineers of the various power and communication interests working in closest co-operation in the solution of the difficult problems of interference.

It has been appreciated for some time that practically all of the noise interference in telephone circuits from power circuits is caused not at all by the fundamental power frequencies, but by the harmonics in the power waves.

There has not been, however, any simple means of determining the relative effect of different power wave shapes in causing such interference. To care for this, the standards committee of the American Institute of Electrical Engineers has adopted some new rules relating to what is known as "telephone interference factor." The telephone interference factor of a power wave is a figure which gives the comparative interference caused by the power wave in paralleling telephone circuits. The rules also describe a simple apparatus for determining this factor for any given power wave.

### Ocean Cable Operation.

By the extended use of magnifiers, the message capacity of ocean cables has been greatly increased. Magnifiers of the Huertley, Dixon, and selenium cell types, and high-speed cable relays of the Brown, Bruce, and other types have been used with great success during the past two years in ocean cable operation.

Considerable research and development work has been done in connection with the application of automatic printing telegraph apparatus to ocean cables, with the result that satisfactory automatic operation over an ocean cable between Heart's Content, Nfd., and Valentia, Ireland, has been accomplished. This represents the first time that automatic printing telegraph apparatus has been successfully used on a long ocean cable.

### Multiplex Telephony.

A multiplex telephone system was put into commercial use during the year by

the American Telephone & Telegraph Co. between Baltimore, Md., and Pittsburgh. This system gives four circuits over a single pair of wires in addition to the ordinary telephone circuit over the same pair. This multiplexing makes use of "carrier currents," each telephone channel being operated at a different carrier frequency.

The vacuum tube plays a very important part in this system. The transmission of the carrier frequencies over telephone circuits and the separation of the different frequency ranges from each other at the terminals has required a very large amount of development work. The system promises to have a considerable field in long distance telephone service.

**Visual and Photographic Receiving of Wireless Messages.**

C. A. Hoxie, engineer, General Electric Co., is the inventor of a device whereby wireless messages are visualized and also photographed, and with the aid of this invention, the eye may be used to supplement or entirely replace the ear in reading wireless messages.

The visual and photographic recorder is an instrument designed to photographically record radio signals on a specially sensitized paper tape 19 millimeters wide. The signals are recorded by means of a beam of light being reflected from a small mirror attached to a galvanometer of special design. This galvanometer is placed in parallel with the telephone receivers of an ordinary wireless receiving set, a portion of the energy of the incoming signal being used to operate the galvanometer.

By this means the mirror is made to vibrate very rapidly whenever a dot or dash is impressed upon the circuit. The source of light comprises two incandescent lamps of special design, the reflection from one being used to make the record on the sensitized tape, the lights from the other being projected on a small ground glass screen, thus making the vibrations visible, which enables the operator to properly adjust the machine and also to read the message if the rate of sending is not too rapid.

The paper, by means of a system of pulleys, gears and a small motor, is made to slowly pass the point of exposure, thence successively through the developer, fixing bath, washing and drying tubes to a basket at the end of the machine, the elapsed time between the time of exposure and its delivery into the basket being about two minutes. The projection of the tape into and from the developing, fixing, washing and drying tubes is entirely automatic, this being accomplished by a system of relays operated by a small storage battery.

Due to the selectivity of the instrument, signals can be recorded through strong interference. This characteristic enables this machine to successfully record under conditions met with in practice, in fact regular daily traffic is now being recorded between France and the Naval Radio Station at Otter Cliffs, Bar Harbor, Me.

The type of machine now used by the government and those now under construction are capable of recording at a speed of 1,250 letters or 250 words per minute, although the speed at which they can be transmitted at the present time is considerably less than this. The recording speed of the machine above referred to is limited by the mechanical feed and development of the tape. The galvanometer is capable of recording at speeds much higher than this.

Doubtless it may be said that two of the chief factors in the great advancement of wireless communication since 1914 are the continuous wave system and the thermionic or French valve, for the experimenting and perfecting of which much credit must be given to our Signal Corps in France and Flanders.

**Telegraphic and Telephonic Wireless.**

The valve can be used as an amplifier, relay, oscillation producer, rectifier, in fact there would seem to be no end to the uses it will ultimately be put to. One valve amplifies six times, two valves 36 times, three valves 216 times and so on.

The Australian station has used 15 valves receiving from Carnavon, Wales. This number of valves on a short distance sounds like a steam whistle, and as a signaller remarked: "With any more, you would certainly hear the angels singing." Successful reception of the voice is now obtainable between the same points with three valves.

The continuous wave system is now a success in trans-Atlantic wireless telegraphy. The old original spark system is being discarded in its favor, a great saving in power being effected thereby. It may be assumed with confidence that the problem of providing a suitable sensitive receiving device is solved.

The cascade and regenerative arrangements of the all-important thermionic valve which has rendered possible radio-telegraphic communication for distances of 6,000 miles and over, are equally suitable for telephonic reception of speech. It would seem reasonable to suppose that, in the near future, continuous wave wireless and the valve will be operated as an adjunct to our present railroad and commercial telegraph and telephone systems.

Earth-conduction wireless telegraphy has been used to a considerable extent in the war zone for distances up to three or four miles, distance being regulated by battery strength. A buzzer, telegraph key, amplifier, induction coil, two iron pins to plug in on the earth with a piece of well insulated copper wire stretched between the pins comprise this inexpensive outfit.

The weakest wave reaching the distant station is sufficient to operate when the valve is on the job. Telegraph signals and telephone conversation passing along wires may be read and heard on this apparatus placed one mile and a half from the pole line.

**Wireless Telephony.**

The American Telephone & Telegraph Co. reports that practically all recent development in wireless telephony involves the use of the audion, either as generator, modulator, amplifier or detector of radio signals. More advance has been made in receiving than in transmitting features, some of the most interesting developments being improved methods of static reduction the loop receiver and highly selective directional receivers, all of which have been made possible by the audion amplifier.

During the past year, wireless telephony has been successfully applied by the navy to communication between vessels in close formation—also to communication within a fleet of submarine chasers. The wireless telephone has also been successfully used by aircraft for communication within a formation and with ground stations.

**Simplex Local Morse and Selector Telephone Circuit.**

Due to the action of the salt and spray arising from the Great Salt Lake in Utah, across which the Southern Pacific Railroad operates, both the construction and maintenance of telegraph and telephone circuits are very difficult. These adverse conditions created the necessity which forced the Telegraph & Telephone Department of the Southern Pacific to evolve something unique, if not entirely new in the way of a combination local Morse and telephone selector circuit.

The Salt Lake district is 120 miles long and 35 miles wide and to construct circuits across it, it was necessary to drive piling of sufficient height and distance from the trestle to maintain wires above and away from the spray. There were two wires along this 120 mile section—one a No. 9 B. & S. copper, the second wire consisting of 50 miles of copper and 70 miles No. 8 galvanized iron.

This pair of wires was simplexed and AC type telephone selectors installed at eight local stations. Morse instruments were likewise installed at the eight intermediate stations. Repeating coils were placed at each intermediate station with a 5-AC repeating coil having 1,000 ohms resistance on each side of the simplex bridge, at the terminal of the circuit, which is 120 miles from Ogden, Utah.

At Ogden, there were placed 40 No. 21-AA, m. f. condensers, bridged with 800 ohms resistance in series with the line which connects with a 60-A selector ap-

paratus case. Equipment arranged in this way prevents current drain on battery during long impulses. The 800-ohm bridge around condensers lengthens impulses and prevents distant selector dropping off between steps.

To cause the selector to properly release during long impulses, it is necessary that the condenser should be removed or short-circuited in the 60-A selector set and the station selector set should be connected across the secondary of the repeating coil.

The circuit operates on a minimum of 200 volts. A 357-W repeating coil, specially designed, is installed at each intermediate station.

In addition to the eight intermediate telegraph and telephone stations, there are nine intermediate telephones installed at blind sidings for the use of trainmen.

This circuit has operated with entire satisfaction for a period of a year.

### A Combination Selective Telephone and Quad Circuit.

The Southern Pacific has a simplex telephone circuit, Los Angeles to Indio, a distance of 130 miles with 21 intermediate telephone selector stations. One of the wires comprising this pair is used as a quadruplex circuit, Los Angeles to El Paso, polar side being 810 miles in length. The common side operates between Los Angeles and Tucson, a distance of 502 miles, without repeaters, the "Goslin" type of quad being used on this circuit.

As is known, the "Goslin" quad is wired in multiple, which cuts out the 800 ohm resistance in the neutral relay at both terminals.

Both telephone and quad operation from this circuit is reported to be highly satisfactory.

### Automatic Signal Storage Battery Operates Morse Sounders.

The New York Central is utilizing automatic station, main storage battery to operate telegraph sounders in all stations from Buffalo east where the storage battery is available. Very satisfactory results reported to be had from this arrangement.

### Audible Alarm for Rectifiers.

The New York Central has a rectifier in a room separated two doors from the telegraph office at Utica, N. Y. Due to different causes, the mercury arc is at times put out of commission. In order that telegraphers in the telegraph office may know when this occurs, an audible alarm of sufficient sound was installed in the telegraph office which operates when the rectifier fails.

The alarm consists of a bridge across the output wires of a small one-ohm relay in series with 650 ohms' resistance. The relay is held closed until the period of no current, at which time the armature falls back and closes a local circuit which operates a bell in the telegraph office.

It is thought the audible alarm arrangement is susceptible of considerable further development by the use of a repeating sounder having perhaps three or four turns of No. 12 wire on each magnet sounder to be placed in series with one of the output wires.

### A New Jack Box and Signal.

A new six-line jack box and signal, suitable for either magneto, ringdown or D. C. selector operation, has been placed on the market.

### Simplex Block Telephone Circuit.

The New York Central reports operating a station-to-station simplex block telephone circuit a distance of 272 miles, voltage at terminals 160 and 200, respectively. Telegraph wire derived from this simplex has 60 No. 150-ohm relays and 88 No. 47-A repeating coils in it.

Notwithstanding the large number of repeating coils, this long telegraph circuit operates satisfactorily without increasing the voltage at either terminal or the installation of intermediate battery or repeaters.

### Duplex Wireless Telephony.

E. F. W. Alexanderson, consulting engineer of the General Electric Co., has perfected wireless telephony to the extent that it will be possible to converse practically any distances. Satisfactory tests have already been made over a distance of 3,200 miles.

One of the outstanding features of the system is the "barrage receiver." This was found necessary in order to neutralize the overwhelming intensity of the transmitted signal so as to make the receiving set sensitive to the faint impulses of the distant signal. The barrage receiver is fundamentally a unidirectional receiver. The principle followed by the inventor was:

1. That the antennas should be aperiodic, because the balance of two tuned circuits is fundamentally very delicate and difficult to adjust for a perfect balance.

2. That the balancing should consist in neutralizing the electromotive forces in the aperiodic antennas before those electromotive forces have had a chance to create oscillating currents. The phase-shifting device should therefore be aperiodic.

3. The two or more antennas should be of the same character; in other words it is preferable to balance a magnetic exposure against another magnetic exposure rather than against an electrostatic exposure.

Other features of the system are:

(a) High Frequency Alternator: This is rated at 200 k. w. and the whole machine weighs about 12 tons without its base. Has a solid wheel which weighs nearly three tons and rotates at 2,100 revolutions per minute. The machine has a frequency of 22,000 cycles per second.

(b) Multiple-Tuned Antennae: If two sets of wires are mounted on the same masts, the radiation from one set to the other is obviously so strong that the over-powering of an ordinary receiving set by the transmitted energy would be almost of the same order of magnitude as if the identical wires were used. Two methods of neutralization have been used —inductive and static (capacitive) neutralization. The capacitive neutralization is preferable on account of accuracy of adjustment and simplicity.

### Selectors Operated by Chemical Rectifiers.

Chemical rectifiers are in limited use by a few railroads to provide current for selector ringing where 60-cycle current is available and where the voltage required is not greater than 150. Within this limit, fair satisfaction is said to have been obtained.

It is claimed the rectifier from which best results have thus far been secured is the McIntosh, costing about $35. The majority, however, of rectifiers now in use are constructed by the roads using them and consist of four salammoniac type battery jars with an iron plate as negative and an aluminum plate as positive. This outfit, including necessary coils, switches, transformers, etc., costs approximately $30. Renewals are required about every six months and cost $2.50.

A comparison of the cost of operating a circuit with a chemical rectifier as against dry cells was decidedly in favor of the former.

This investigation also indicated motor generators to be more efficient and economical than dry cells, the rectifier being a satisfactory and economical substitute for both motor generators and dry cells for circuits requiring only low voltage for operation.

Some roads which have their own direct current for lighting or power use this current for selector ringing, adding a sufficient number of dry cells to bring the current up to desired voltage

A comparative statement showing miles of railroad operated by telegraph and telephone is as follows:

| Date. | Total miles road | Telegraph miles of road | Telephone miles of road | % of miles of road operated by Telegraph | % of miles of road operated by Telephone |
|---|---|---|---|---|---|
| Jan. 1, 1918 | 244,356 | 142,119 | 110,404 | 58.2 | 45.2 |
| Jan. 1, 1919 | 244,134 | 136,584 | 113,440 | 55.9 | 46.4 |
| | *222 | *5,535 | †3,036 | | |

*Decrease. †Increase.

From this it will be noted that there was a decrease of 5,535 miles in the length of railroad line on which the telegraph was used for the transmission of train orders and an increase of 3,036 miles in the length of railroad line on which the telephone was used for the transmission of train orders.

# *Fundamental Principles of the Telephone Business*

***A Reading Course Designed to Present Logically the Principles Which Underlie Successful Organization and Operation of Telephone Properties—Prepared Under the General Supervision of Stanley R. Edwards—This Section, "Part VII, Telephone Engineering Economics," Written by Chas. W. McKay***

### Quiz Questions on the Preceding Installment.

126. Where should house cable terminals be located in old buildings? Discuss the terminal for use in exposed locations.

127. How is the task of installing house cable systems in old apartment or hotel buildings frequently simplified?

128. Why is it customary to make splices in the house cables on the roof of the buildings before placing the cables in their proper location in the cable shafts?

129. Describe two methods of supporting house cables in shafts. Which is the better, and why?

130. What is the only splicing work to be done after a cable is lowered into place in the shaft?

131. Describe and illustrate a plan by means of which the necessity for having a splice in the house cable at every floor is obviated. Why can a diminishing cable be used in connection with this plan?

## CHAPTER IV. House Cable Systems (Concluded).

132. *Multipling of pairs in house cables.*—In planning for the splicing of a house cable it is well to have the cable pairs on at least several of the floors in multiple—in other words, to have the same pair numbers appear in two or more of the terminals. The reason is that occasionally there is a demand for party-line service in office buildings and the multipling of a few of the pairs will effect an economy in the house cable.

In cities where there are two separate telephone companies, obviously, it will either be necessary to provide a complete house-cable system for each company or to effect some mutually agreeable compromise as to the joint use of a common house-cable system. A house-cable system designed for joint use is illustrated in Fig. 51. This illustration is taken from an actual installation in a mid-Western city having both Bell and Independent telephone systems. The scheme has proven remarkably well adapted to meet the peculiar needs of the case in question.

133. *Re-cabling an old building.*—Before leaving the subject of house cables, and house-cable splicing, it may be well to consider the case of an old building having an inadequate cable system, due to lack of foresight on the part of engineers who originated the cable system. Such a case is illustrated in Fig. 52. The building is an old office building in which the house-cable system at the time was the result of piece-meal construction over a long period of years.

As will be obvious from the illustration, it was found necessary to remove nearly all of the old cable and to replace it with a modern house-cable system of

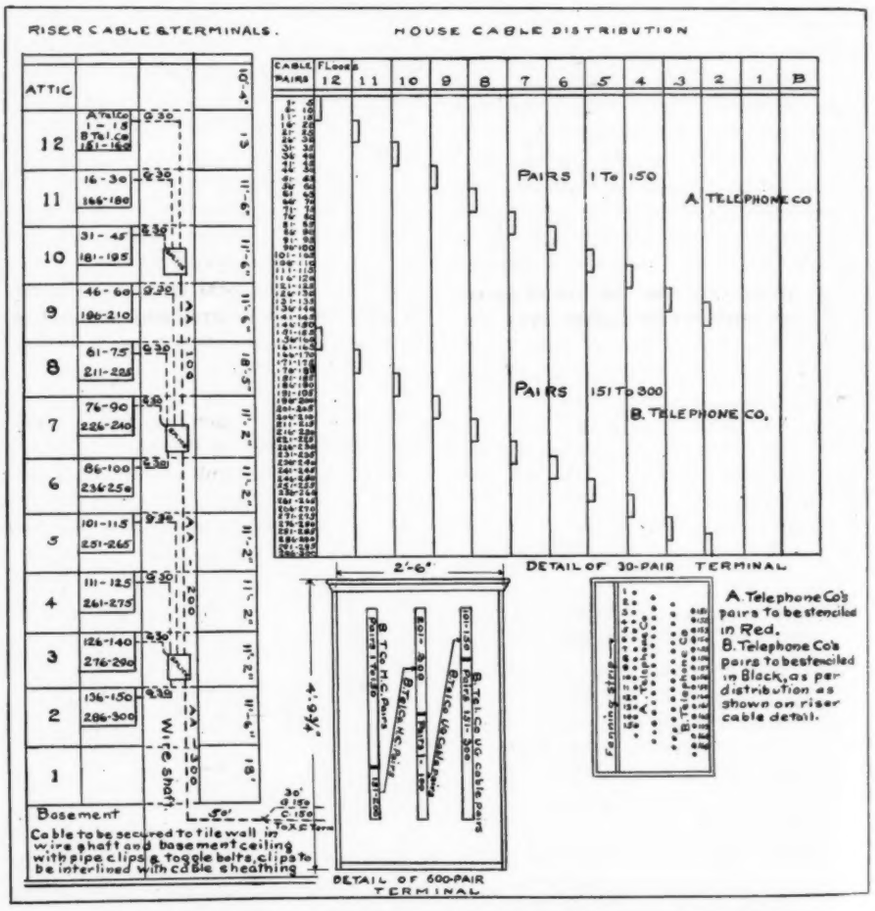



**Fig. 51. House Cable System for Use of Two Telephone Companies.**

*tribution* systems—the aerial cable, the block cable and the house cable—has been completed. Next comes the problem of the design of the *feeder* system—especially the underground feeder system. The so-called "aerial feeders" were discussed in Chapter III, sections 59-100.

There is one marked difference between these two problems—the design of a distribution system and the planning of an underground feeder system. Distribution systems, as a rule, involve the use of comparatively small-sized cables, and cables, almost without exception, are so located as to render the cost of replacement excessive.

It is considered good engineering practice, therefore, to place cables of sufficient size to provide for the ultimate requirements as called for in the development study. A suggestion to this effect was made in a preceding chapter. The economies effected by using temporary cables, capacity adequate to meet the ultimate requirements. New cable is shown by the heavy lines, old cable yet in service by light lines, and old cable to be removed from service by the light lines with crosses.

## CHAPTER V. Underground Cable Systems.

134. *Distribution systems and underground feeder systems.*—A consideration of the engineering problems involved in the planning of the various types of *dis-*

of a size smaller than the ultimate, are negligible. Furthermore, the costs of replacing and re-splicing such cables are apt to be prohibitive.

In the case of an underground feeder system, however, it is obviously better to have the feeder plant keep pace with—or, more properly speaking, to keep just a step in advance of—the subscriber line growth. Feeder cables are usually large and, therefore, costly. Furthermore, the problem of providing additional feeder facilities is a comparatively simple one, due to the fact that the cables are placed in conduits, especially provided for the purpose.

135. *Ultimate feeder requirements.*—After considering all of these facts, the reader will doubtless agree that it would be foolhardy to attempt to provide for the ultimate feeder requirements at the time of the initial installation. Any lingering doubt as to this phase of the problem may be dispelled by considering the relative annual costs of a large idle cable system and a smaller system so designed as to care for the immediate requirements economically, and still provide a reasonable leeway for growth.

136. *Design of underground feeder systems.*—The development study necessarily plays a most important part in the design of underground feeder systems. It will be remembered that the size of aerial distribution and feeder cables was determined by considering the number of *ultimate* subscriber's lines called for by the development study. In a similar manner the size of feeder cable, and the number of cables required, should be ascertained by determining the *immediate* subscriber line needs, as shown by the development study, making due allowance for a reasonable growth during the period immediately following the original installation.

The first problem confronting the plant engineer, in the the design of an underground feeder system, involves the determination of the size of "units" to be employed. By the term "unit", as used in this connection, is meant size of cable. In large cities 900 and 1200-pair cables are used as units of underground feeder distribution. In smaller cities, the 600 and 400-pair units are used extensively.

137. *Use of diminishing cables.*—When the problem of providing underground feeder facilities for the larger towns and cities first became a serious one, it was customary to make extensive use of so-called "diminishing" cables. A large cable, say a 600-pair, would be run from the central office straight to the district to be served—or in other words, to a district requiring 600 feeder pairs.

As soon as this local area was reached, the cable would be gradually reduced in size. The first reduction may have been to a 500-pair cable; the next to a 400-pair; then to a 300-pair; next to a two, and so on. At each reduction point, the number of pairs dropped was terminated in a cable stub of corresponding size.

The method of distributing the cable pairs in a 600-pair diminishing cable is illustrated in Fig. 53. The case illustrated is rather an extreme one, in that the cable is diminished by 100-pair stages in consecutive manholes. As a rule, where diminishing cables are used, the stubs are located several manholes apart and the reductions are 200-pairs each, thus making the stubs 200-pair.

138. *Objection to diminishing cable method.*—The thought underlying the diminishing method of feeder distribution is that it results in an economy of cable and, therefore, in a monetary saving. *This reasoning has again and again been proven faulty.* The difference in cost between short lengths, 500 and 600, or 500 and 400-pair cable—placed and spliced—is negligible. As a matter of fact, what little monetary saving there may be, is more than offset by the increased cost of providing relief—this for the reason that adequate relief may only be had by making a series of "throws" (by "throw" is meant the transfer of distribution pair assignments from one cable to another) from the congested cable to the relief cable.

*(To be continued.)*

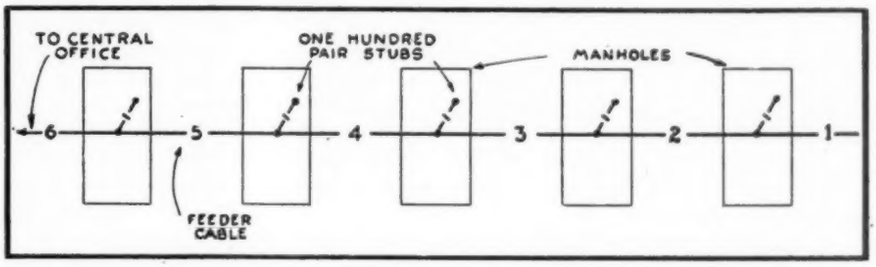



Fig. 53. Method of Terminating 600-Pair Diminishing Cable.

## Purchases Alabama Exchange.

A. B. Mathews, formerly of Dothan, Ala., has purchased the Cottondale Telephone Exchange of Cottondale, Ala. He has assumed its management and will in the future reside in that city.

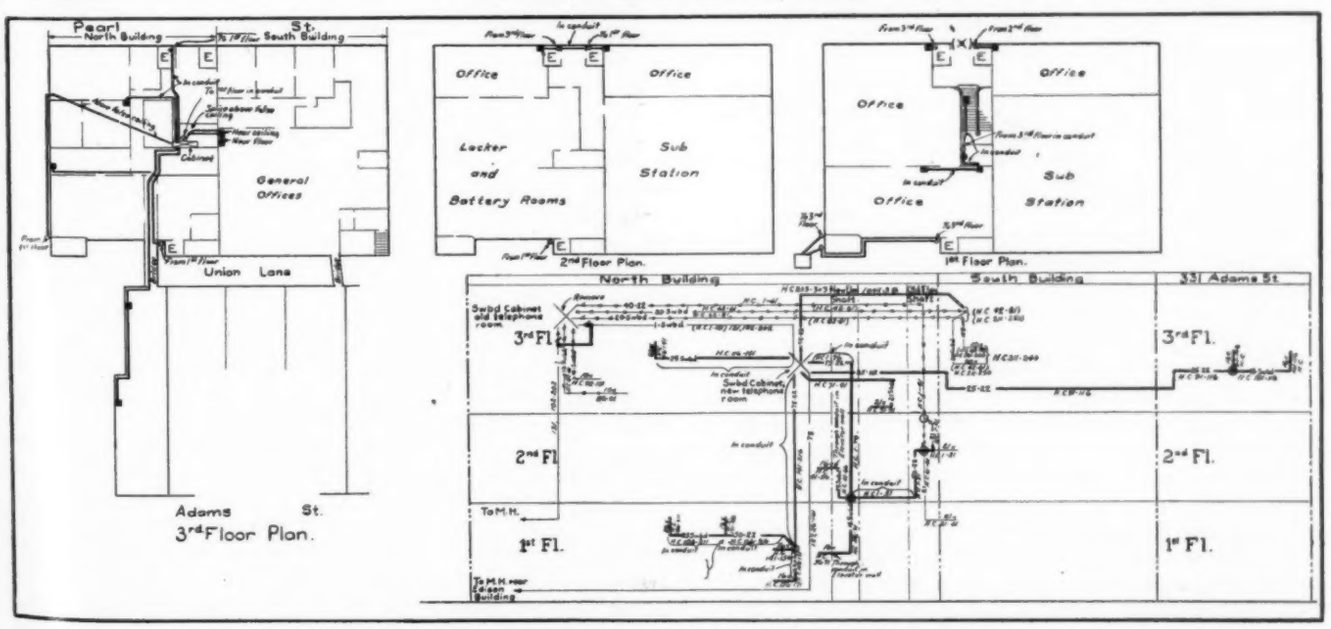



Fig. 52. Illustration of the Remodeling of an Old House Cable System.

# Turning Junk Into Dividends

## Some Suggestions for the Solution of the "Junk Pile" Problem in the Small Exchange by Re-Salvaging and Repairing Defective or Discarded Apparatus, Thus Adding to Surplus Available for Dividends—Solving Transmission Problems

By Wm. R. L. Dwyer

Among the problems with which a manager or wire chief is liable to come in contact upon assuming the duties of a new position in a magneto exchange of from 500 to 2,000 subscribers, nothing is more discouraging than to find the transmission throughout the system so weak, and the circuits so noisy, that it is almost impossible to carry on conversation steadily.

While this condition exists the subscribers complain that "Central cuts us off;" that "the telephone is all right at times, and at other times it dies away;" that they "have to ring back before Central can hear them," and mention other annoyances of like nature.

A second discovery perhaps will be that about one-fourth as many telephones as are in use at subscribers' stations are piled up in some back room or supply barn, and designated as the "junk pile."

The writer does not claim that many plants are in the condition mentioned but that too many are is an admitted fact. It is the purpose of this article to show how both problems may be solved and the "junk pile" even made to assist the dividend account.

The first and most vitally important thing to do is to get the operators' talking circuits up to a point where transmission will fully satisfy commercial requirements.

As everyone knows, first impressions are lasting, and if a subscriber cannot hear the operator, or has difficulty in making her hear, he is very likely to form an off-hand opinion that "service is no good." On the other hand, if the operator comes on the line with a strong, clear "Number?" spoken with a proper tone and inflection, and is able to take the number the first time it is given, a subscriber's confidence is at once established, and even if the conversation with the called subscriber is a little weak, it will usually pass unnoticed.

If the operator starts a subscriber's conversation wrong, the imperfect transmission may furnish a basis for a strong protest upon the next visit of the collector.

Some boards are still equipped with old so-called "solid back" transmitters made with carbon diaphragms, gold electrodes, corn-plasters, and about a handful of cheap granular carbon. A manager who takes an exchange with any of these left in service can afford to do but one thing—discard them at once and procure some modern solid back transmitters of Independent manufacture with a metal diaphragm and having the electrodes and a small quantity of high grade granular carbon enclosed in a metal cell or button about ¾ of an inch in diameter, this button having one electrode rigidly fastened to the center of the diaphragm, and the other to the solid back or bridge.

These transmitters may be either suspended from supports projecting from the switchboard framework, or mounted on a breastplate to be worn by the operator. The latter method is the best, as it makes it possible to preserve a uniform distance between the operator's lips and the transmitter, and thus give more uniform transmission.

*With the prevailing high cost of telephone equipment and supplies, "conservation" is the watchword among telephone managers and employes. The "junk pile," consisting of defective or discarded equipment, however, is an unsolved problem in many small telephone exchanges.*

*The accompanying article was published in* TELEPHONY *of July 30, 1910, but inasmuch as the suggestions contained therein may be applied equally well at the present time, it is being reprinted. A review of fundamentals is always profitable, so a review of a good article is stimulating.*

The operator's receiver should be of the modern concealed binding post type, with a durable insulating shell to prevent the operator from receiving a shock in case a winding should be grounded on the metallic part of a receiver.

The receiver should be equipped with a thin diaphragm made of ferrotype metal. An objection to diaphragms made of aluminum with a small circular disk of sheet iron riveted to the center, such as are sometimes found in old receivers, is that operators will attempt to clear them of accumulated moisture through the hole in the ear cap, by means of a handkerchief on the end of the finger or a pencil. In a short time the aluminum diaphragm, being less elastic than one made of ferrotype metal, becomes dented inward enough to touch the pole pieces of the magnets and greatly impair the receiving qualities of the instrument.

The induction coil should be one designed for the transmitter with which it is used. If monitoring taps are wired to a desk occupied by a chief operator, wire chief or manager, the coil should have a tertiary or third winding.

All wiring in each operator's circuit should be carefully inspected and replaced if not in first-class condition. It is also well to inspect the operators' receiver jack, listening keys, and key shelf wiring for bad contacts in the springs, and loose or "resin" joints where the wiring is attached to permanent equipment. The battery should be adjusted to the requirements of the transmitter, not too weak, nor yet too strong, so as to cause the transmitters to heat, or make a hissing or frying noise in the receiver. Four and a half volts of either storage or gravity battery are about right, although transmitters of some makes will operate satisfactorily with as high as six or eight volts.

If gravity batteries are used, they need to be frequently inspected and cleaned to keep them up to a uniform standard. If storage cells are used, the battery feed wires for each operator's set should be carried from the transmitters separately to short, heavy bus bars located close to the battery, and connected to its terminals by copper wire of ample size; otherwise there will be trouble from cross talk between the operators' position.

If subscribers' boards are not already equipped with steel switchboard cords, it will pay to discard the tinsel cords. There are a number of good steel cords on the market, and tinsel cords are a prolific source of cut-outs. Moreover, the life of a steel cord is several times that of the best tinsel cord, and steel cords either work or go perfectly "dead," whereas the tinsel cord will sometimes continue to work, after a fashion, when there is only a tiny thread of the tinsel remaining unbroken; the result, of course, being cut-outs, weak transmission and noisy circuits.

The principal objection to the steel cord is that it has a higher resistance than a tinsel cord, but for local work this is not objectionable. The standard practice in many plants is to use steel cords on the local boards and tinsel on the toll boards, on account of their lower resistance.

Upon taking charge of a new exchange, it is well to carefully inspect all joints where wires in switchboard cable are soldered to jacks, as well as all screw and washer connections, or soldered joints on cross connecting racks and fuse and heat coil protectors, tightening up and resoldering, with resin core solder, all that appear defective.

Taking these steps to prevent troubles should put the central office apparatus in good shape for efficient transmission, and all that remains is to eliminate, as fast as possible, the bad contacts in cable boxes, lines and instruments, and to equip all telephones having weak or defective transmitters with new or repaired instruments.

It may be well to add here that "official" telephones used by managers, wire chiefs, chief operators, etc., should be brought up to the highest efficiency in the same way as the operators' sets and for the same reasons.

Noisy circuits, especially where local circuits are connected to toll lines and repeating coils are not used, are generally caused by the presence of grounds. Every line in the exchange should be tested, and the ground leakage reduced to the lowest possible point.

Turning our attention to the defective or discarded apparatus of the actual "junk pile," a great deal of stuff will probably be found in it which should not be there at all. Some trifling defect, such as a broken carbon diaphragm in the transmitter, or a dented one in the receiver, dirty contacts, a broken wire on the switch hook or induction coil, a burn-out in a winding, a generator gummed up enough to prevent the shunt from operating and needing only a drop of oil to make it work perfectly, may have caused many an instrument to be condemned by a repairman who did not know the circuits of his instruments, or how to test and locate the trouble in some particular part of the telephone. This is why an instrument good for years of service is often thrown into the junk pile.

**Receiving the New Employe.**

It is evident that a good deal of money is wasted when instruments that cost perhaps $12 or $14 only a few months before are discarded for some trifling defect which could have been repaired on the subscriber's premises by a better-educated repairman. At the worst the defective part might have been located and replaced without bringing in the whole telephone and installing a new one.

However, the fact remains—the instruments are there, stacked up like so much cord wood, and the problem is to dispose of them, get them out and get them to earning rental instead of letting them lie there, a dead investment.

At one exchange where the writer was employed he found a pile of approximately 200 instruments in various conditions and of various makes and styles, representing an investment of probably $2,000. It was seen that simply putting them back into service would save enough to pay a 6 per cent dividend on over $16,000 after the cost of repairs was deducted, or to change the dividend from 5 to 6 per cent on $100,000 capital.

This lot of instruments was sorted and divided according to make and style, and letters were written to their various manufacturers requesting that they send their bulletins showing circuits, parts and prices of parts of the different styles of instruments.

**Renewing Woodwork.**

The woodwork of the apparatus was then washed with warm water and Sapolio, care being taken not to get the water into any of the apparatus. Telephones in fair condition were treated with furniture polish, after which they were given a finishing polish with a soft rag. The furniture polish was made up at the local drug store as follows:

| | |
|---|---|
| Linseed oil | 1 pint. |
| Pure cider vinegar | 1 pint. |
| Alcohol | 3 ounces. |
| Butter antimony | 3 ounces. |
| Muriatic acid | 1 ounce. |

The sets having woodwork badly stained by old wet batteries, or otherwise, or which had their original finish worn off, were smoothed up with sandpaper, and given a coat of varnish, care being used, as with the water, not to get any varnish into the apparatus. Perhaps some of the modern paint and varnish removers would have worked more quickly and better than the sandpaper and it is suggested that the reader make some experiments along this line.

The instruments were next given a thorough inspection for loose contacts. All bad connections were soldered with resin core solder, acids or pastes not being used on account of their corrosive after-effects. All defective parts were then removed from the instruments and shipped into the manufacturers' shops for repairs. At the same time an order was made up for all parts that were lost or damaged beyond repair.

The writer has often wondered why more of the Independent companies do not send their defective apparatus into the factory to be repaired and given a new lease of life. It has long been the practice of the Bell companies to do this. Several Independent manufacturing companies turn out repaired apparatus that is in excellent condition, all parts being repolished, japanned and renickled, defective insulation renewed, etc. The charges for the factory repair work are very reasonable, and the saving over the purchase price of new apparatus amounts to a considerable sum.

Receiver shells and mouthpieces can usually be purchased from some of the manufacturers of hard rubber, fiber or composition specialties, if not furnished by the telephone manufacturing companies, and if samples are submitted you can get just what you want and be sure of its fitting your apparatus.

Upon the repaired and new parts being received from the factories, the instruments were fitted up complete and tested out for both talking and ringing. As soon as an O. K. tag was attached, they were set aside, ready to be installed as needed.

Some of the telephones were of the old tandem box type, arranged for two wet cells, one above the other, and as most subscribers nowadays prefer a short telephone, the backboards and battery boxes were sawed off to half length, which still left room enough for two or three dry cells.

Many of the transmitters were replaced with new solid backs of the metal diaphragm, button type, most of which were purchased direct from the factory, although some few were selected from the bargain sheets of dealers in second hand and rebuilt telephone apparatus.

Practically all of the old receivers were found to be in good enough condition to be repaired locally, by adjusting them and putting on new shell or diaphragms. Some of the old receiver shells were in pretty good shape, and some of the furniture polish mentioned was found to be just the thing to restore the finish and color the rubber and metal parts. Contrary to expectations, the muriatic acid in the polish did not cause any corrosion to take place.

As some bridging telephones were needed for rural lines under construction, and as almost all the telephones repaired were of the series type, some open-shunt pulsating current three-bar generators were ordered. The ringer movements were taken out of the telephones and shipped in to a Chicago firm which rewound them from 80 to 1,000 ohms for a small sum.

The new generators were then fitted in the telephones in place of the old closed shunt type used for series work, and, of course, the ringers, after being rewound, fitted back into the instruments from which they had been removed. After the necessary changes had been made in the wiring, the old series instruments were complete and ready for use as bridging telephones.

**Cost of Resalvaging Instruments.**

The entire cost from junk pile to a complete farmers' line telephone, including transmitters, open shunt generators, rewound ringer and new receiver cord, averaged only about one-half the price of a new instrument of equal efficiency.

Some of the instruments of the com-

For Maximum Profits Install Automatic Completely

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

THE more completely you use Automatic the greater the profit that accrues and the better your service becomes.

But the entire change need not be made all at once.

Installed at a toll switching point, the Automatic cuts down operator hire and increases the traffic capacity of the lines.

As private exchange systems in large commercial establishments, the Automatic has proved its value both to operating companies and to subscribers alike.

Branch exchanges (either city or country) equipped with the Automatic, give 24-hour service at no extra cost, and operate at a minimum of expense.

Adopting any or all of these features of Automatic operation will not disarrange your present telephone equipment. The Automatic will operate in entire harmony with your existing switchboards, local or toll.

And when you make the complete change, the Automatic equipment already in service will become part of the unified whole.

We shall be glad to discuss with you any of these uses of Automatic Equipment.

AUTOMATIC ELECTRIC COMPANY
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pact type which were in good condition were fitted with harmonic ringers and a condenser and gave good service on four-party harmonic lines.

Few tools were used in doing the work, and aside from the usual tools used by a repairman, consisted of a 12-tooth panel saw, a push drill, a small iron plane, an 8-inch steel square, a ¾-inch wood chisel, three or four metal twist drills for use in a brace, three or four auger bits of various sizes, a hack saw, and a few files, all of which could be purchased for what would be saved on the repair of two instruments.

Since the old instruments have all been worked up, whenever an instrument is brought in or disconnected for any reason, it is at once inspected and repaired and made ready to go out again. In this way the bogus junk pile is prevented from forming again, and the money it used to represent is put into dividends.

## Operating Expenses Continue to Show Big Increase.

The operating expenses of telephone companies continue to increase in much greater proportion than the operating revenues, as may be observed in the tables shown on this page, which are compilations from 65 reports of revenues and expenses of Class A telephone companies for the months of March and April, 1919, filed in the Bureau of Statistics of the Interstate Commerce Commission. As a result, the operating incomes show a decrease over the same period of 1918.

Although the operating revenues for the month of March show an increase of 12.4 per cent over the previous year, the operating expenses increased 23.9 per cent, resulting in a decrease of 9.8 per cent in net operating revenues, or 15.9 per cent in operating income. The ratio of expenses to operating revenues for this month is 72.5 per cent as compared with 65.8 in March, 1918. For the three months ended with March, the ratio is 73.6 per cent as compared with 69.18 for the first quarter of the previous year.

The April summary shows an increase of 12.3 per cent in operating revenues, an increase of 18 per cent in operating expenses, an increase of .3 per cent in net revenues and a decrease of 2.1 per cent in operating income. The operating expenses for the month were 71.3 per cent of the operating revenues, as compared with 70.2 per cent in 1918, while for the four months ended with April they were 72.8 per cent as compared with 66.15 for the same period the preceding year.

On March 31, 1919, the companies whose reports are included in these compilations had in service 8,113,019 stations, an increase of 3.2 per cent over the previous year and on April 31, 1919, they had in service 8,173,645 stations, an increase of 3.4 per cent.

| | For the month of March. | | Increase (or decrease). | | For the three months ended with March. | | Increase (or decrease). | |
|---|---|---|---|---|---|---|---|---|
| Item. | 1919. | 1918. | Amount. | Ratio per cent. | 1919. | 1918. | Amount. | Ratio per cent. |
| Number of company stations in service at end of month | 8,113,019 | 7,861,916 | 251,103 | 3.2 | ..... | ..... | ..... | .... |
| Revenues: | | | | | | | | |
| Subscribers' station revenues | $19,486,991 | $17,816,363 | $1,670,628 | 9.4 | $57,716,838 | $53,166,252 | $4,550,586 | 8.6 |
| Public pay station revenues | 1,653,347 | 1,504,574 | 148,773 | 9.9 | 4,758,295 | 4,510,955 | 247,340 | 5.5 |
| Miscellaneous exchange service revenues | 323,009 | 292,119 | 30,890 | 10.6 | 969,726 | 880,823 | 88,903 | 10.1 |
| Message tolls | 8,867,498 | 7,392,622 | 1,474,876 | 20.0 | 24,721,798 | 20,832,136 | 3,889,662 | 18.7 |
| Miscellaneous toll line revenues | 799,145 | 693,202 | 105,943 | 15.3 | 2,424,956 | 2,058,030 | 366,926 | 17.8 |
| Sundry miscellaneous revenues | 360,060 | 320,905 | 39,155 | 12.2 | 1,105,806 | 905,076 | 200,730 | 22.2 |
| Licensee revenue—Cr. | 1,142,757 | 1,042,027 | 100,730 | 9.7 | 3,399,471 | 3,099,048 | 300,423 | 9.7 |
| Licensee revenue—Dr. | 1,141,133 | 1,040,500 | 100,633 | 9.7 | 3,394,298 | 3,094,274 | 300,024 | 9.7 |
| Telephone operating revenues | $31,491,674 | $28,021,312 | $3,470,362 | 12.4 | $91,702,592 | $82,358,046 | $9,344,546 | 11.3 |
| Expenses: | | | | | | | | |
| Depreciation of plant and equipment | $ 5,490,792 | $ 3,469,343 | $2,021,449 | 58.3 | $16,391,075 | $12,706,771 | $3,684,304 | 29.0 |
| All other maintenance | 4,376,354 | 3,896,427 | 479,927 | 12.3 | 12,771,059 | 11,373,089 | 1,397,970 | 12.3 |
| Traffic expenses | 8,493,653 | 7,069,962 | 1,423,691 | 20.1 | 25,083,711 | 20,834,415 | 4,249,296 | 20.4 |
| Commercial expenses | 2,998,732 | 2,708,305 | 290,427 | 10.7 | 8,997,542 | 8,046,829 | 950,713 | 11.8 |
| General and miscellaneous expenses | 1,491,632 | 1,295,520 | 196,112 | 15.1 | 4,206,873 | 3,846,417 | 360,456 | 9.4 |
| Telephone operating expenses | $22,851,163 | $18,439,557 | $4,411,606 | 25.9 | $67,450,260 | $56,807,521 | $10,642,739 | 18.7 |
| Net telephone operating revenues | $ 8,640,511 | $ 9,581,755 | *$ 941,244 | *9.8 | $24,252,332 | $25,550,525 | *$1,298,193 | *5.1 |
| Other operating revenues | $ 4,643 | $ 1,681 | $ 2,962 | 176.2 | $ 23,142 | $ 4,946 | $ 18,196 | 367.9 |
| Other operating expenses | 4,341 | 2,451 | 1,890 | 77.1 | 13,655 | 6,704 | 6,951 | 103.7 |
| Uncollectible operating revenues | 112,665 | 119,998 | *7,333 | *6.1 | 351,934 | 372,427 | *20,493 | *5.5 |
| Operating income before deducting taxes | 8,528,148 | 9,460,987 | *932,839 | *9.9 | 23,909,885 | 25,176,340 | *1,266,455 | *5.0 |
| Taxes assignable to operations | 2,075,696 | 1,792,741 | 282,955 | 15.8 | 6,123,265 | 5,752,020 | 371,245 | 6.5 |
| Operating income | $ 6,452,452 | $ 7,668,246 | *$1,215,794 | *15.9 | $17,786,620 | $19,424,320 | *$1,637,700 | *8.4 |

| | For the month of April. | | | | For the four months ended with April. | | | |
|---|---|---|---|---|---|---|---|---|
| | 1919. | 1918. | Amount. | | 1919. | 1918. | Amount. | |
| Number of company stations in service at end of month | 8,173,645 | 7,902,765 | 270,880 | 3.4 | ..... | ..... | ..... | .... |
| Revenues: | | | | | | | | |
| Subscribers' station revenues | $19,670,632 | $17,993,692 | $1,676,940 | 9.3 | $77,387,471 | $71,159,945 | $6,227,526 | 8.8 |
| Public pay station revenues | 1,630,791 | 1,410,806 | 219,985 | 15.6 | 6,389,086 | 5,921,761 | 467,325 | 7.9 |
| Miscellaneous exchange service revenues | 339,431 | 292,897 | 46,534 | 15.9 | 1,309,156 | 1,173,721 | 135,435 | 11.5 |
| Message tolls | 8,755,679 | 7,421,949 | 1,333,730 | 18.0 | 33,477,477 | 28,254,084 | 5,223,393 | 18.5 |
| Miscellaneous toll line revenues | 825,900 | 687,639 | 138,261 | 20.1 | 3,250,856 | 2,745,669 | 505,187 | 18.4 |
| Sundry miscellaneous revenues | 377,267 | 330,925 | 46,342 | 14.0 | 1,483,073 | 1,236,001 | 247,072 | 20.0 |
| Licensee revenue—Cr. | 1,118,987 | 1,017,359 | 101,628 | 10.0 | 4,518,458 | 4,116,407 | 402,051 | 9.8 |
| Licensee revenue—Dr. | 1,119,562 | 1,015,832 | 103,730 | 10.2 | 4,513,859 | 4,110,107 | 403,752 | 9.8 |
| Telephone operating revenues | $31,599,125 | $28,139,435 | $3,459,690 | 12.3 | $123,301,718 | $110,497,481 | $12,804,237 | 11.6 |
| Expenses: | | | | | | | | |
| Depreciation of plant and equipment | $ 5,542,388 | $ 4,125,812 | $1,416,576 | 34.3 | $21,933,463 | $16,832,583 | $5,100,880 | 30.3 |
| All other maintenance | 4,368,701 | 3,957,796 | 410,905 | 10.4 | 17,139,760 | 15,330,886 | 1,808,874 | 11.8 |
| Traffic expenses | 8,309,780 | 6,906,775 | 1,403,005 | 20.3 | 33,393,491 | 27,741,190 | 5,652,301 | 20.4 |
| Commercial expenses | 3,029,583 | 2,715,845 | 313,738 | 11.6 | 12,027,125 | 10,762,674 | 1,264,451 | 11.7 |
| General and miscellaneous expenses | 1,225,202 | 1,338,686 | *113,484 | *8.5 | 5,432,075 | 5,185,102 | 246,973 | 4.8 |
| Telephone operating expenses | $22,475,654 | $19,044,914 | $3,430,740 | 18.0 | $89,925,914 | $75,852,435 | $14,073,479 | 18.6 |
| Net telephone operating revenues | $ 9,123,471 | $ 9,094,521 | $ 28,950 | .3 | $33,375,804 | $34,645,046 | *$1,269,242 | *3.7 |
| Other operating revenues | $ 5,164 | $ 1,275 | $ 3,889 | 305.0 | $ 28,306 | $ 6,220 | $ 22,086 | 355.1 |
| Other operating expenses | 5,358 | 2,188 | 3,170 | 144.9 | 19,012 | 8,892 | 10,120 | 113.8 |
| Uncollectible operating revenues | 125,393 | 131,399 | *6,006 | *4.6 | 477,327 | 503,826 | *26,499 | *5.3 |
| Operating income before deducting taxes | 8 997,884 | 8,962,209 | 35,675 | .4 | 32,907,771 | 34,138,548 | *1,230,777 | *3.6 |
| Taxes assignable to operations | 2,071,222 | 1,888,850 | 182,362 | 9.7 | 8,194,488 | 7,640,880 | 553,608 | 7.2 |
| Operating income | $ 6,926,662 | $ 7,073,349 | *$ 146,687 | *2.1 | $24,713,283 | $26,497,668 | *$1,784,385 | *6.7 |

*Decrease.

**Statistics of Reports from 65 Class A Companies, Compiled by the Interstate Commerce Commission, Show Steadily Rising Expenses and Decreasing Operating Income.**

# What Is Your Company Doing?

## Chats About Company Doings.

By Stanley R. Edwards.

A number of years ago the Central Home Telephone & Telegraph Co. inaugurated a plan of paying cash prizes on June 30 and December 31 of each year to all plants in its system which finished with 100 per cent collections. The company was not so particular as to how the managers got their money, that is, if they chose to go out and get some in advance, they were still ranked as 100 per cent.

"We figured by continuing this policy," says W. M. Brown, the company's general auditor, "that we would gradually work around to a point where we could demand 'No Balances.' It seems that we have about reached that point. Our managers tell us that they can finish the year 1919 without a dollar outstanding which, of course, is all we can ask of them."

It is interesting to note the standing of the three districts of the company. They are ranked on the basis of the percentage of "No Balance" plants, rather than on the collection average, as shown in the following list which shows the standing of exchanges for collections by districts June 30 of this year:

Central District, Supervised by General Office:

Guthrie, per cent, 116.5, no balance, Jno. E. Chambers, mgr.
Carrollton, per cent, 100.3, no balance, J. W. O'Bannon, mgr.
Owensboro, per cent 102.5, no balance, W. T. Black, mgr.
Russellville, per cent 101.3, no balance, Jno. E. Chambers, mgr.
Bowling Green, per cent 100.3, H. P. Myers, mgr.
Average—101.2 per cent.

Western District, E. M. Veatch, District Manager:

Mayfield, per cent 104.2, no balance, J. H. Locke, mgr.
Marion, per cent 101.5, no balance, G. C. Gish, mgr.
Salem, per cent 101.5, no balance, G. C. Gish, mgr.
Providence, per cent 98.7, no balance, R. J. Counts, mgr.
Clay, per cent 98.7, no balance, R. J. Counts, mgr.
Marshall, per cent 97.0, no balance, Chester Wyatt, mgr.
Paducah, per cent 100.5, K. E. Spears, com. mgr.
Smithland, per cent 98.0, R. H. Smith, mgr.
Average—100.8 per cent.

Eastern District, J. J. Veatch, District Manager:

Cynthiana, per cent 102.2, no balance, C. M. Mynheir, mgr.
Owenton, per cent 99.2, no balance, C. H. Hardesty, mgr.
Lawrenceburg, per cent 103.5, G. C. Duncan, mgr.
Nicholas, per cent 103.5, no rental bal., J. C. Head, mgr.
Maysville, per cent 101.2, W. C. Corman, mgr.
Paris, per cent 100.5, W. H. Cannon, mgr.
Frankfort, per cent 99.8, H. L. Mason, mgr.
Average—101.2 per cent.

The standing of exchanges for collections June 30 was as follows:

Guthrie, per cent 116.5, no balance.
Mayfield, per cent 104.2, no balance.
Owensboro, per cent, 102.5, no balance.
Cynthiana, per cent 102.2, no balance.
Marion, per cent 101.5, no balance.
Salem, per cent 101.5, no balance.
Russelville, per cent 101.3, no balance.
Maysville, per cent 101.2, no balance.
Carrollton, per cent 100.3, no balance.
Owenton, per cent 99.2. no balance.
Providence, per cent 98.7, no balance.
Clay, per cent 98.7, no balance.
Marshall, per cent, 97.0, no balance.
Nicholas, per cent 103.5, no rental balance.
Lawrenceburg, per cent 103.5.
Paris, per cent 100.5.
Paducah, per cent 100.5.
B. Green, per cent 100.3.
Frankfort, per cent 99.8.
Smithland, per cent 98.0.
Average—101.2 per cent.

---

It will be noticed that the central district, which is at the top of the list, has the same average as the eastern district, which is at the bottom of the list, but that the central district has five "no balance" plants out of a possible six as against three out of a possible seven for the eastern district.

"In order to create the competitive spirit among our men," states Mr. Brown, "we show these averages and standings each month and it is very interesting to note how, from time to time, the positions of the districts shift from one place to the other."

"In connection with this hard-fought collection campaign, it is very odd but it is a fact that the harder our men fight for 'no balances,' the more new business comes to them. Our new business campaign for the six months ending June 30 has been exceptionally successful. We attribute it to no other cause than that the men are right on the qui vive watching every opportunity. We are making a harder fight during the month of July than ever before because we wish to turn the properties back to the owners without a dollar outstanding."

---

The campaign ending June 30, the results of which have just been given, was commenced January 1, 1919, with a view of collecting every dollar for business done during the period and also clean up any unpaid balances which were brought forward January 1. As shown in the list, a large number of the plants finished on June 30 with an absolutely clean slate. The six plants which failed to wipe the slate clean have less than $600 outstanding uncollected. That's some record, we'll say.

---

Just recently the Washington Supreme Court rendered a decision in a case which apparently has no precedent, although only a couple of months ago a subscriber wrote us for advice relative to a similar case.

The Washington case involved the liability of telephone companies for injuries to non-subscribers while using a company's instrument. A man and wife had permission to use their neighbor's telephone. The wife was injured while doing so and they brought suit against the company. They were not subscribers and had no contractual relationship with it, so the court held that at best they were in the position of a mere licensee.

The subscriber was not the owner of the telephone, simply a purchaser of service, and his contract with the company gave him no agency for it. The only obligation of the company to the plaintiffs came through the use of the subscriber's telephone by his permission but without the company's knowledge.

---

The question for the court to determine was the rights under the subscriber's contract, for the telephone, unlike other electrically operated instruments, is not highly dangerous as its wires do not carry a dangerous current.

The company's contract with the subscriber gave its protection to all persons who were intended to be benefited by it. It assured a right of recovery for mere negligence to the subscriber's family, its servants, guests, persons working about the house for the benefit of and at the request of, the owner, and all persons who could be said to have been in the contemplation of the company and the subscriber as liable to make use of the telephone in the reasonable, ordinary and customary conduct of a house such as the one involved.

In regard to all persons outside the contemplation of the contract, the company, in order to be held liable for their injury, must be shown to have been more than merely negligent. The plaintiffs were accustomed to use their neighbor's telephone and he had established for them, in fact, a free telephone service. This he could not do, for no such use of the telephone was reasonable or anticipated by the company when it was installed, or afterward sanctioned.

In public or business places, the cases may be different and the company liable to users the same as to subscribers, but

the private residence in the absence of agreement to that effect is not supposed to be a public telephone station.

In the court's opinion, those using a residence telephone for their own purposes and not in the interest of the subscriber, and for their own convenience and not casually or as members of the household, either permanently or temporarily, are at best so far as the company is concerned, mere licensees.

As between the plaintiff's wife and the subscriber, the former was entitled to the exercise of ordinary care for her safety. But as between the parties to this particular suit, she was no more than a mere licensee. No proof having been presented of wilful injury, the plaintiffs were held not entitled to recovery.

---

At a recent meeting of the New York Electrical Society, A. McL. Nicolson of the research laboratory of the Western Electric Co., by merely agitating a one-ounce crystal of Rochelle salt, produced a current of electricity sufficiently strong to carry the sound of a phonograph through various circuits to 160 telephone receivers which were distributed through the audience.

The discovery of this power in the Rochelle salts was made, he explained, during experimental work carried on shortly after our entrance into the war. The salts were at first used with other elements to create electric force, and finally the experts found that they could use them alone.

"A crystal of the chemical may be mounted in a suitable holder into which a phonograph needle is inserted," said Mr. Nicolson. "If it be held in the hand over a moving phonograph record the vibrations from music or speech that are imparted to it through the needle will generate sufficient electricity to operate a large number of receivers connected in series. Thus about 25 people may 'listen in' to the changes which are in progress in a single crystal.

"If instead of a phonograph record ordinary speech be applied to a crystal which is placed within a suitable box, the sound may be imparted to a larger number of receivers.

"A crystal may be operated as a receiver and speech may be heard several feet away if a microphone transmitter is employed at the sending end to magnify the sound. If the vibrations imparted to a crystal transmitter are passed through an amplifier then correspondingly loud effects are to be produced by the crystal receiver."

In an explanation given of this action of Rochelle salts by another engineer it was explained that all crystals arrange their parts in certain symmetrical ways. Merely bending a Rochelle salt crystal, Mr. Nicolson, by a very simple mechanical motion, produces an electromotive force which gives him electric current.

The transformation of mechanical force into electrical force is very efficient, when it is considered that the efficiency of this transformation is about 30 per cent, while the efficiency of the best locomotive is only about 25 per cent.

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We're discovering and learning something new every day. Think of the centuries that the great forces of electricity remained inert as regards commercial use—yet electricity undoubtedly was potentially existent at the time Noah emerged from the Ark, and even many years before that.

About 160 years ago Ben Franklin drew electricity from the clouds—and we're just beginning to use it to talk, stutteringly, across the ocean. The art of flying is less than 20 years old—and the other day two men flew across the ocean in 16 hours—some achievement, everyone admits. That, though, was due primarily to development of the mechanical art—and mechanics dates back to the time of Archimedes—so electrical development is not so slow after all, even though the record of the magnetic properties of lodestone—the first electrical discovery—dates back to A. D. 1269.

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The Johnson County Telephone Co., Warrensburg, Mo., keeps itself in the public eye by means of a bulletin board it erected on the corner of the court house square. On this board, as may be seen in the accompanying illustration, are posted the daily market and weather reports which are read by hundreds daily. The market and weather reports are also sent out daily over the company's farm lines.

The company's name appears right under the large lettering at the top of the board, informing persons reading the reports that they are "furnished by the Home Telephone Co." As Warrensburg is greatly interested in stock market reports, this service "touches the right spot," for the promotion of company friendliness.

---

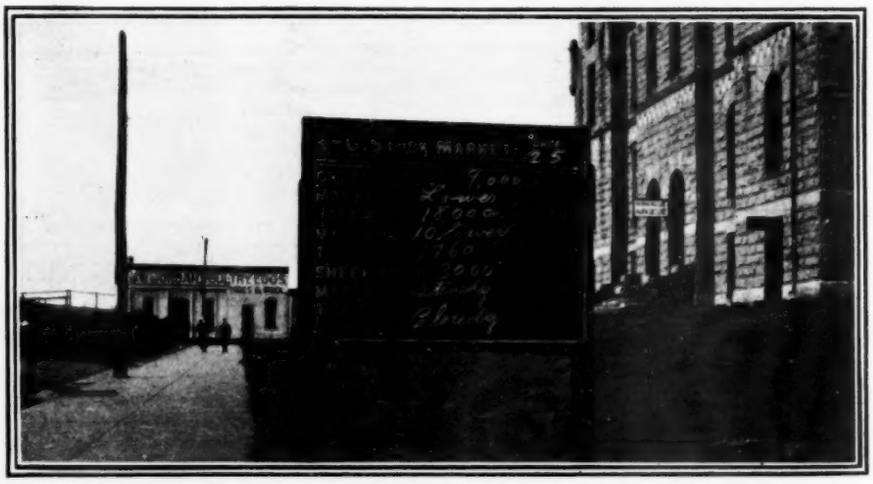
A wedding in the air—the bride and bridegroom in one airplane piloted by the latter, and the clergymen in another—was a recent novelty at the Sheepshead Bay Speedway near New York City.

And as if being married 2,000 feet above the earth were not enough, the couple entered into their alliance by that ultra modern device, the radio telephone. While the great throng sat hushed and immobile in the stands, the knot was tied, and by means of megaphones attached to one of the radio telephone receivers and pointed at the spectators from various places, every syllable of the service was audible to all. By a curious coincidence the most clearly audible of all that was said, was the bride's firm "I will," spoken at the proper moment in the ceremony.

Miss Emily Schaeffer, of Seagate, N. Y., was the bride and Lieutenant George Burgess of the Army and Aviation Corps was the bridegroom. The Rev. Alexander Wouters performed the ceremony.

For a few seconds after the airplanes took to the air the spectators heard nothing but the steady hum of the propellers, then there sounded a "Hello, hello, hello!" It was the bridegroom's voice, and in response to an inquiry the minister could be heard saying, "Yes, yes, I hear you."

After that there was the regular wedding ceremony.



**Bulletin Board of One Telephone Company, on Which Is Posted Daily Market and Weather Reports, Is Read by Hundreds Daily.**

## Cut-Over of Home System in South Bend and Mishawaka.

Approximately 50,000 telephones in South Bend and Mishawaka, two northern Indiana cities, are operating on one system as a result of the cutting over at midnight, Saturday, July 26, of the Home Telephone Co.'s system to that of the Central Union Telephone Co. It required just 12 minutes to make the change.

# Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision Over Telephone Companies—Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchises, Rates and Service

### Indianapolis Merger Awaits City Council's Action.

Glenn Van Auken, of the Indiana Public Service Commission, has prepared an order fixing the value of stock held by the shareholders who were not heard from in the voting of the stock of the Indianapolis Telephone Co. in favor of the sale of that company to the Central Union Telephone Co. There were no votes cast against the sale and only the holders of a few shares were not heard from.

The commission's order estimates the par value of the preferred stock at $100 a share and the common stock is estimated at $5 a share. The holders of the stock not heard from will be permitted to accept these values or to wait for the final adjustment of the company's affairs. The sale of the Indianapolis company's property now awaits action of the city council in transferring the franchise to the Central Union company.

### Whiting, Ind., Asks Restoration of Old Rate Schedule.

The situation in regard to telephone rates in Indiana, brought about by the end of government control, took a new turn last week when the city of Whiting filed a petition with the Indiana Public Service Commission demanding that the rates of the Chicago Telephone Co. in that city be reduced to the level at which they stood before Director-General Burleson ordered an increase.

The Chicago Telephone Co. is one of the companies the Indiana commission attempted to keep from making higher rates effective. According to the commission's records the city of Whiting is the first in the state to file a petition with the commission asking that the rates be reduced. A number of Indiana telephone companies have petitioned for permission to retain the higher rates.

### Free County Service Restored by Indiana Company.

Free telephone service to Orleans, in Orange county, to Fredericksburg, Campbellsburg and Pekin, in Washington county, and between all country exchanges has been restored as a result of an ultimatum, signed by practically every patron of the telephone lines in Washington county who were affected by a system of toll rates recently put into effect by the Hoosier Telephone Co. at Salem, Ind.

The ultimatum had been sent to the Hoosier company, stating that unless tolls were removed every telephone would be discontinued.

### Three Indiana Companies Petition for Rate Increases.

Petitions asking for increases in rates were filed with the Indiana Public Service Commission, August 8, by three Indiana telephone companies. The Citizens Telephone Co., of Upland, asks for a primary business rate of $2.50 and a residence rate of $1.75. The Edwardsport (Ind.) Telephone Exchange and the Freelandville (Ind.) Co-operative Telephone Co. ask for a general revision of rates.

### Michigan Municipalities' League and Telephone Affairs.

Under a recent agreement between the Michigan League of Municipalities and the new Michigan Public Utilities Commission, all matters concerning telephone rates in the state will be considered as a whole, but every city will be given a separate hearing with regard to peculiar conditions existing in its own telephone territory.

This announcement was made in Lansing following the receipt of a petition from the League of Municipalities, requesting that after August 1, 1919, the Burleson metered service telephone rates in Detroit be set aside and that they be replaced by the flat rates which were in effect prior to the taking over of telephone systems by the government.

The petition requests that the rates of 1917 be put into effect while the commission investigates the whole telephone situation in Michigan, preparatory to promulgating an order covering all telephone exchange areas in the state. The petition was drawn by a sub-committee of the executive committee of the League of Municipalities, composed of Clarence E. Wilcox, corporation counsel of Detroit; John F. O'Keefe, corporation counsel of Saginaw, and Ganson Tagart, corporation counsel of Grand Rapids. The main outlines of the petition were agreed on at a meeting in the attorney general's office which was attended by representatives of the principal cities of the state and by Alex J. Groesbeck, attorney general.

The petition requests that competition in the telephone business in Michigan be done away with by combining the exchanges or establishing physical connection between the competing systems in communities that have two services and by division of territory so that duplication of equipment will be discontinued as quickly as possible. It asks the commission to investigate the entire telephone situation, including the investments in property, labor costs and other factors entering into the cost of service throughout Michigan.

A specific demand is made that the contract under which each state telephone company turns over to the American Telephone & Telegraph Co. 4½ per cent of its gross income be set aside. The commission is also requested to investigate the toll question regarding interstate and intrastate service and to compel the Michigan company to make some arrangement by which it will receive proper compensation for its service in relation to toll calls.

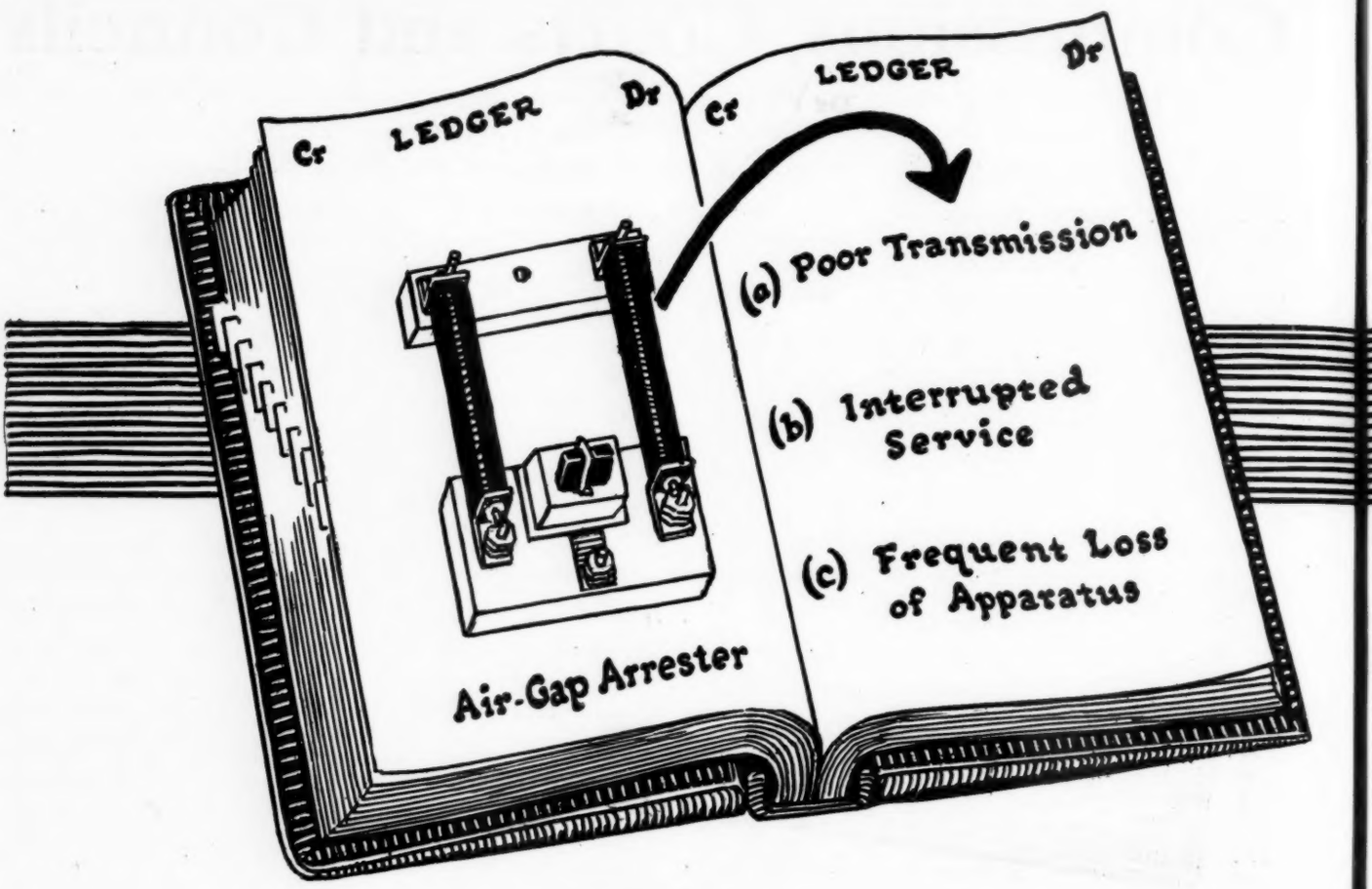
At present the Michigan State receives nothing for toll calls coming from other states and delivered through its exchanges and only 10 cents each for toll calls originating in its own exchanges. The commission is petitioned to fix the depreciation charge of the telephone companies at not more than 5 per cent valuation. The Keiser order allowed 5 6/10 per cent for depreciation.

The league petition asks that returns allowed the telephone company be fixed at not more than 7 per cent on the investment. The Keiser order allowed 8 per cent on a valuation that included several items of intangible values.

### New Tentative Schedule of Rates for State of Michigan.

Following its decision to lower the Burleson rates after the telephone companies had been turned back to private ownership by the Postmaster General, the Michigan Public Utilities Commission has fixed upon a new schedule of rates, which, however, does not affect Grand Rapids or Detroit. The rates were agreed upon by representatives of the Citizens Telephone Co., of Grand Rapids, and the Michigan State Telephone Co. at a meeting with the commission at Lansing, and the new rates are a slight modification of the rates requested by the companies in an application filed with the old railroad commission in January.

In Grand Rapids, unless there is objection from the city authorities, the rates in force on the Citizens lines will be extended to the Bell lines. Detroit rates still are in the balance, the city insisting metered service be done away with and the company demanding continuance of

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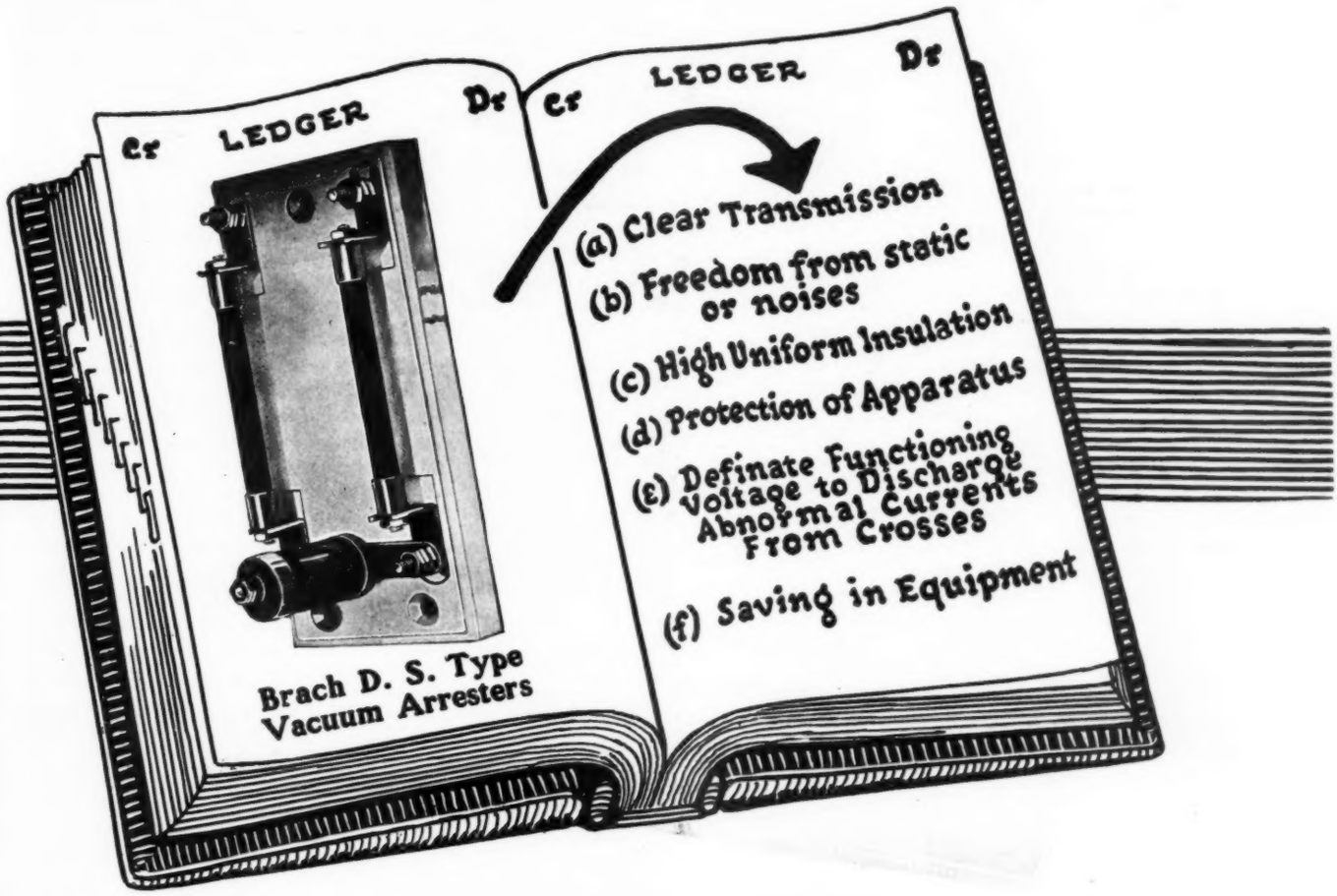
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the metered system and the Burleson rates.

The rates as agreed upon are as follows:

Communities of from 50,000 to 100,000, including Flint, Saginaw and Bay City, $54 for one-party line business telephone; $48 for two-party business telephone; $33 for one-party residence; $27 for two-party residence; $21 for four-party residence.

From 30,000 to 55,000 population, including Jackson, Battle Creek, Kalamazoo and Lansing, $51 for one-party line, business; $42 for two-party line, business; $30 for one-party residence; $27 for two-party residence; $21 for four-party residence.

From 15,000 to 35,000, including Pontiac, Port Huron, Ann Arbor, St. Joseph, Benton Harbor, Calumet and Houghton, $42 for one-party line, business; $36 for four-party line, business; $27 for one-party residence; $24 for two-party residence; $21 for four-party residence.

From 3,000 to 20,000 population, $36 for one-party line, business; $30 for four-party line, business; $24 for one-party residence; $21 for two-party residence; $18 for four-party residence.

From 1,500 to 4,500 population, $30 for one-party line, business; $24 for four-party line, business; $18 for one-party residence; $15 for four-party residence.

Less than 2,000 population, $24 for one-party line, business; $18 for one-party residence; $15 for four-party residence.

These are tentative rates and are to remain in effect only until the commission fixes permanent rates after an investigation into the investment of the companies, the value of the properties, cost of rendering service and type of service rendered.

## Michigan Commission to Make Appraisals of All Utilities.

The Michigan Public Utilities Commission will begin at once to build up engineering and accounting departments with the view of eventually making an inventory and appraisal of every public utility in Michigan coming under its jurisdiction.

At a conference with the governor and state officials, August 5, the commission was authorized to expend whatever may be necessary in doing this important part of its work in establishing a basis on which fair and equitable rates for the public and the utilities may be made.

"This does not mean we will employ a large technical force all at once," said Chairman Smith, of the commission. "We will employ men in these lines just as we need them and gradually add to the permanent organization men of ability as engineers and accountants. I am confident this will not only add to the efficiency of the commission and its work, but in the long run be a matter of economy. When we fix rates, we should have some impartial valuation other than the company's figures, and the estimated claims of the other side."

## Grand Rapids Merger Plans Filed with City Commission.

The terms upon which the Citizens Telephone Co. of Grand Rapids, Mich., will continue its negotiations with the Michigan State Telephone Co. for the purchase and merger of the Grand Rapids Bell exchange with its system, were presented to the city commission on July 28.

They include:

Permission to continue the Burleson rates for a period of four months from August 1.

If, during that time, a consolidation agreement is made with the Bell company, then the rates shall continue for an additional period of not to exceed 18 months during which the merger will be made.

A mutual agreement will be made upon a rate, after consolidation, that will take care of a depreciation charge of 6 per cent and any necessary amortization charges, and yield to the company not less than 7 per cent on the value of its physical property.

## Novel Method of Operating Telephone Properties.

An investigation by the Nebraska State Railway Commission of the affairs of the Naponee Telephone Co., in the course of its recent application for a rate increase, revealed the employment of a novel business device by which the owners and officers got rid of all the worry and annoyance of running a telephone plant. They let the job by contract, the lowest bidder to pay all the help and manage the affairs and turn over the net proceeds to the stockholders.

The company had followed the practice of hiring a manager whose duties were to look after the repair and maintenance work, make the collections and supply the necessary operators to handle the board. The company furnishes house and fuel. The manager supplies his own livery equipment and gasoline. At the time the application was made, this was costing $200 a month. Later, when an inventory was being taken, the company had succeeded in hiring a manager at $135 a month, whose wife and one part-time operator, handled the calls. He has since quit, declaring he could not be hired to continue the work.

In passing on the rate application the commission says it does not believe that it can secure the complete service of line work and operating for less than $200 a month for some time to come. The company dates back to 1903, when several mutuals consolidated. It has 200 subscribers and switches 48 others. The commission found a deplorable lack of data in the company's possession. Apparently $5,000 of stock has been issued, but a part of this was without permission. The company has been engaged in buying stock and reselling it and not keeping a proper account of the transactions. For years, it says, the stock record has been in a tangled condition, and the former secretary even could not tell how much had been issued.

For this reason the order limits dividends of 8 per cent on stock issues of $3,453, leaving the remainder of the stock to be validated on application of the company. Except for rebating to stockholders, dividends of modest amounts were paid in two years only. During most of its existence it charged $1 a month and levied assessments to meet the deficit. The company did not, apparently, always charge the scheduled rate to subscribers, but this may have been due to the practice of reporting moneys collected rather than moneys earned.

The present rates are: Business, $1.50 a month; residence, $1; switching, 25 cents. These yield a gross annual revenue of $3,000, and the commission finds that the company neds $3,600. It, therefore, increases business rates to $2, residence and farm to $1 25, and switching to 40 cents. The rates are effective August 1, but the order requires a new switchboard to be installed within three months, the creation of a depreciation reserve and forbids it from using any of the revenue from operation, except the amount allowed for dividends, for extensions of service into new territory, such expansion otherwise to be cared for by approved sales of securities.

## Big Dividend Paid—Difficult in Pleading Rate Case.

Because the Buffalo County Telephone Co., of Pleasanton, Neb., cut a melon in 1918 by declaring a 50 per cent dividend, it is having hard sledding before the Nebraska State Railway Commission in proving its need of higher rates and additional revenue. Secretary Bocher maintains that the money represented deferred dividends antedating 1910, and that the company has been paying an average of but 10 per cent dividends.

The showing of revenues and expenditures for 1919 indicated a deficiency. The deferred dividends, he said, were put into property instead of being drawn, and represent a substitute for stock dividends. The company had a $1,000 surplus in 1918, but the inquiry developed that the wages of operators had been doubled.

Prior to the first of the year the company had been paying operators but 50 cents a day. Their wage is now $1, and the commission sharply criticized the com-

pany for paying such small wages. It had a service complaint recently based on the charge that the girls were incompetent, but Mr. Bocher insisted this was not true, that he hired competent girls before this year for 50 cents a day.

## New Business Rates of Capital Company of Jefferson City.

In publishing the new schedule of rates allowed the Capital Telephone Co., of Jefferson City, Mo., by the Missouri Public Service Commission in TELEPHONY of August 9, page 34, several inaccuracies crept in.

The new rate for direct line business service is $3.15 and for two-party business service, $2.65. The rates given for these classes of service, $2.65 and $2.15, respectively, were the old rates.

## Recovery of Unlawful License Tax by Telephone Company.

A taxpayer may recover a license tax claimed to have been involuntarily paid though he was not threatened with actual imprisonment or threatened with the penalty of having his right to do business taken away.

In an action against the city to recover a license tax paid under ordinance void under Const. art. 13, § 14, where the ordinance imposed the penalty of fine or imprisonment for failure to pay the license, evidence was held by the court to sustain the finding that the plaintiff had been coerced into paying the license tax. —Home Telephone & Telegraph Co. vs. City of Los Angeles; District Court of Appeal, California; 181 Pacific, 100.

## Hearing of Complaints Relative to Service in New York.

The New York Public Service Commission, on August 8, began taking testimony on complaints that the New York Telephone Co. is not giving adequate service and conditions are constantly growing worse. Among those who appeared to testify against the company were Stuart Browne, of the New York Real Estate Association; Franklin Taylor; H. M. Winkler, representing the Council of Jewish Women; Assemblyman Edward F. Healy, Mark Goldstein, and several representatives of the Merchants' Association. Assistant Corporation Counsel Stanton appeared for the city. F. H. Bethell, first vice-president of the telephone company, was also present.

In the complaint filed by Mr. Browne, the charge was made that the company had been underpaying its operators and that the latter had been purposely giving wrong numbers and rendering generally unsatisfactory service. A representative of the company denied this statement, but admitted that the war had in a measure demoralized the service and that while about 6 per cent of the numbers received were wrong some mistakes were due to the subscribers.

F. H. James suggested that the company be requested to pay subscribers for time needlessly used on the same basis as the subscriber is charged. He also suggested that monthly statements sent to subscribers show each number called, that the company be barred from refusing service to a subscriber because of the latter's refusal to pay a bill on the ground that it contained errors. The cost of any legal action arising from such a matter should fall upon the company, said Mr. James.

A suggestion was adopted that a committee be selected from among the complainants to investigate the company's plant. Mr. Bethell said that he would gladly welcome the committee. Chairman Hill announced that a further hearing would be called when the committee was ready to report.

## Dell Rapids (S. D.) Company Gets Increase in Rates.

The Dell Rapids Telephone Co., which operates exchanges in Dell Rapids and Trent, S. D., serving 511 subscribers at the former place and 114 at the latter, was authorized by the South Dakota Railroad Commission, in a ruling rendered July 24, to file and put into effect rental rates not exceeding the following:

| | |
|---|---|
| Business, main line, per month | $2.25 |
| Residence, main line, per month | 1.40 |
| Residence, party line, per month | 1.25 |
| Rural, party line, per month | 1.50 |
| Desk sets, extra, per month | .25 |
| Extension sets, per month | .50 |

The company is permitted to bill its subscribers 25 cents per month in excess of the rates quoted for exchange and rural service, this amount to be discounted for prompt payment.

It was found upon investigation that the present rates of $2 for business service, $1 for residence, and $1.50 for rural telephones were entirely inadequate. A fair value of $30,000 was placed upon the property for the purpose of considering this case and 7 per cent was allowed for depreciation.

## Rate Increase Allowed to Delmont (S. D.) Telephone Co.

The Delmont Telephone Co., which furnishes exchange service to 102 subscribers at Delmont, S. D., and switching service for the Chateau Creek, Farmers West, Northwest Farmers and Farmers Northeast telephone companies, with a total of 202 subscribers, was granted permission by the South Dakota Railroad Commission recently to increase its business rate 50 cents per month and its residence rate 25 cents per month. The new rates are as follows:

| | |
|---|---|
| Business main line | $2.00 |
| Residence main line | 1.25 |
| Desks sets extra | .25 |
| Rural main line switching | .75 |
| Rural party line switching | .25 |
| Extension sets complete | .50 |
| Extension sets, talking only | .25 |

The company is permitted to bill its subscribers 25 cents per month in excess of the rates quoted for exchange service, from which a discount of that amount is allowed for prompt payment.

The commission ordered the company to enter into written contracts with all companies that receive switching service at its exchange.

## Ethan (S. D.) Telephone Co. Granted Increase in Rates.

The Ethan Telephone Co., which furnishes service to 23 business and 30 residence subscribers from its exchange at Ethan, S. D., was recently authorized by the South Dakota Railroad Commission to increase its business rate from $1.50 to $2 per month and its residence rate from $1 to $1.25 per month, with an additional monthly charge of 25 cents for desk sets.

The company is permitted to bill its subscribers at rates 25 cents in excess of those given for exchange service, the difference to be discounted for prompt payment.

## Farmers Order Telephones Out as Result of Rate Increase.

There is a telephone war on at Mt. Horeb, Wis., and in the rural districts surrounding. Some time ago the Mt. Horeb Telephone Co. received authority from the Wisconsin Railroad Commission to increase its rates. The farmers in that vicinity protested strongly against any increase but the raise was ordered.

The farmers, by the scores, are ordering their telephones taken out and refuse to pay for any service. Now the telephone company threatens those participating in this action with conspiracy and boycott and damage suits are threatened.

The farmers, headed by T. S. Spaanum, of Springdale, have sought legal advice in the matter and have been advised that there is no liability or damage possible as a result of any action that has been taken.

## Industrial Commission to Fix Wage for Night Operators.

There will be no postponement of the date of the enforcement of the Wisconsin minimum wage order, it was decided August 8 by the Industrial Commission. A special hearing will be held at a date subsequent to be determined upon, relative to the application of the minimum wage order to telephone exchanges.

In small exchanges the operators are able to sleep a considerable part of the night, and consequently it would not be fair to count the entire time they are nominally on duty. To determine what

is a fair wage for such night operators, the Industrial Commission is now writing all telephone companies asking them to conduct a "peg count" for the period of one month, so that the commission may have information as to the number of calls which are received at various hours during the day and the night.

After this "peg count" is completed, the Industrial Commission will conduct a hearing upon this general subject and will issue special orders with reference to the period of time for which telephone companies must pay during the night hours.

## Summary of Commission Rulings and Schedule of Hearings.

CALIFORNIA.

August 1: The commission ordered a complete investigation of telephone and telephone rates, to begin September 2 for the telephone and September 3 for the telegraph companies.

FLORIDA.

July 31: Petition made by committee representing the Florida Independent Telephone Association that hearings be held to determine future telephone rates.

GEORGIA.

August 5: Hearing on the proposed extension by the Southern Bell Telephone & Telegraph Co. of the rates allowed by Postmaster General Burleson from December 1, 1919, to December 1, 1920.

ILLINOIS.

September 12: Hearing on the petition of the Chicago Telephone Co. asking that the telephone rates put into effect by the Postmaster General during the period of federal control be made permanent.

INDIANA.

August 8: Petitions filed by the Citizens Telephone Co., of Upland, the Edwardsport Telephone Co., of Edwardsport, and the Freelandville Co-operative Telephone Co., of Freelandville.

August 8: Petition filed by the city of Whiting demanding that the rates of Chicago Telephone Co. be reduced to the level at which they stood prior to the taking over of the telephone systems by the government.

KANSAS.

September 24: Continued hearing on the application of the Southwestern Bell Telephone Co. for permission to make permanent the rate increases allowed by Postmaster General Burleson. Some 76 cities and towns are affected by this application.

September 24: Hearing on investigation, on motion of the commission, as to the installation and toll charges of telephone companies operating in that state.

MISSOURI.

August 1: Joint application filed by the Johnson County Home Telephone Co., of Warrensburg, Mo., and the Southwestern Bell Telephone Co. for the approval of the sale by the Bell company to the Home company of its exchange and property in Warrensburg for the sum of $30,000, in payments of $1,500 in 20 installments.

August 4: The commission entered an order instituting a proceeding of investigation and inquiry by which it requires the Southwestern Bell Telephone Co. to show cause as to why it should longer be permitted to continue in effect the increased telephone toll and exchange rates and service connection charges put into effect in Missouri by order of the Postmaster General during the period of his operation of the telephone systems of the United States.

NEBRASKA.

August 4: Supplemental order in application of Lincoln Telephone & Telegraph Co. for increase of rates, fixing rates for multiple P. B. X., at approximately the same percentage of increase as in other special service, as follows: Switchboard with battery power and ringing circuit, with equipment for first 100 lines, $60; each ten lines additional, after first 100, $6; operators' sets, 75 cents; stations, first 100 or less, $80; each additional station, 75 cents; trunks both ways, individual business rate and $1; trunks inward, $5; minimum charge for switchboard per operator position, $20; stations outside of building where switchboard is located, regular station rate plus 60 cents for each quarter mile or fraction thereof on air line distance between building where board is located and building where station is located.

August 5: Application filed by Kearney Telephone Co. for an increase in rates on exchanges at Kearney and Sumner to take care of increased costs of service and to provide a proper return on the investment, now yielding less than 4 per cent.

August 5: Complaint filed by H. B. Howard against Guide Rock Telephone Co., alleging removal of telephone without just cause.

August 5: Application filed by Burlington Railroad Co. for an order upon the Ord Telephone Co. and Ord Electric Light Co., requiring them to obey the state law requirements for wire crossings of railroad tracks, the complainant alleging that its requests for changes are being disregarded.

August 6: Complaint filed by George P. Hoy that the Farmers' Mutual Telephone Co., operating a rural line out of West Point, has arbitrarily deprived him of service. Hoy's complaint is that the officers of the company ordered him to replace the ash poles that he used in building his line from his home to the road with cedar poles, and when he declined, they ordered that service be cut off.

August 6: In the matter of the application of the Wyoming & Nebraska Telephone Co. for permission to increase rates, ordered that until December 31, 1920, the company be authorized to charge the within-named rates for service on exchanges at Crawford, Chadron, Valentine, Gordon, Belmont, Cody, Crookston, Harrison, Rushville and Whitney; commission retains jurisdiction of switching charge question pending submission of further showing as to inadequacy of prevailing 60-cent rate, and urges upon the company that it issue 7 per cent bonds for the purpose of financing new construction rather than by short-time notes that might endanger the financial stability of the company.

August 7: Hearing upon the application of the Platte Valley Telephone Co. for increased rates upon its exchanges at Scottsbluff, Gering, Bayard, Mitchell, Minatare, Morrill and Melbeta. Appearances for company, Walter Jones, president; F. Alexander, secretary, and E. M. Morsman, Jr., attorney; company permitted to amend application by adding a 25-cent rate for Melbeta exchange after automatic service is ready; testimony adduced and cause taken under advisement.

August 8: In the matter of the application of the Republican Valley Telephone Co., of Franklin, for permission to establish gross and net rates; it appearing that the rates prescribed are standard under the rules of the commission, it is ordered that the company be authorized to charge the following rates, with 25 cents off for payment of town service by the 10th of each month in advance, of rural service by the quarter in advance and switching semi-annually in advance: Business, common battery, $2.75, magneto, $2; residence, common battery, $1.75; magneto, $1.50; four-party residence, harmonic, $1.50; rural, $1.25; switching, $2.50 every six months.

September 2: Hearing in the matter of the complaint of the Tri-County Telephone Co. vs. the Gandy Switchboard Co.

September 5: Hearing in the matter of the application of the Northern Telephone Co., of Creighton, for an increase in rates.

October 15: Hearing on proper basis for service connection, move and change of name charges.

NEW YORK.

August 8: Taking of testimony begun on complaints that the New York Telephone Co. is not giving adequate service and conditions are constantly growing worse.

OHIO.

August 3: The Central Union Telephone Co. filed with the commission new rate schedules, effective September 1, which provide in some instances for material increases even above the rates established by the Postmaster General. New schedules were filed for 23 different exchanges.

September 30: Hearing on the application of the Chesapeake & Potomac Telephone Co. for permission to put into effect new rate schedules for its 36 exchanges in the eastern section of the state, which provide increases averaging 20 per cent.

PENNSYLVANIA.

September 17: The commission gave permission to the Bell Telephone Co. of Pennsylvania to file the rates authorized by the Postmaster General but stipulated that a hearing should be held on this date and that notice be given by advertisement for three weeks, showing in a general way the amount of the increases over the rates then on file.

UTAH.

July 30: Order issued requiring the Mountain States Telephone & Telegraph Co. to determine the physical valuation of its property.

VIRGINIA.

November 9: Hearing on the application of the Chesapeake & Potomac Telephone Co. for an order making permanent the rate increases allowed by Postmaster General Burleson as director general of the telephone properties while under federal control.

WEST VIRGINIA.

July 30: Application filed by the Chesapeake & Potomac Telephone Co. for increases in rates throughout the state, amounting to an average of 20 per cent over the present rates.

WISCONSIN.

July 30: Application filed by the La-Crosse Telephone Co., of LaCrosse, for permission to increase its preferred capital stock to the extent of $10,000, to cover the cost of building additions and other improvements.

# Practical Letters—Discussions

## Valuable Instructions on Rural Telephone Line Work.

The engineering department of the Tri-State Telephone & Telegraph Co., St. Paul, Minn., in "Our Emblem," the employes' paper, described briefly the various steps required in rural line construction.

By rural line construction is meant the erecting of a line of poles equipped with brackets or cross arms and stringing wires thereon for the purpose of establishing telephone service within a rural locality or for obtaining town or city exchange service.

There are two kinds of rural line construction, "metallic circuit" and "grounded circuit," the two differing in that the former comprises two wires for each circuit, the latter only one wire and the earth.

The circuits of a rural system connected to a town or city exchange should be metallic, because when they are affected by paralleling high-tension wires, electric light wires, or other telephone wires, there is a remedy by resorting to transpositions.

Grounded circuits by reason of the earth forming a part of the circuit, are always more or less noisy and when joined to other lines which are normally quiet, render them noisy, with the result that the connection is unsatisfactory.

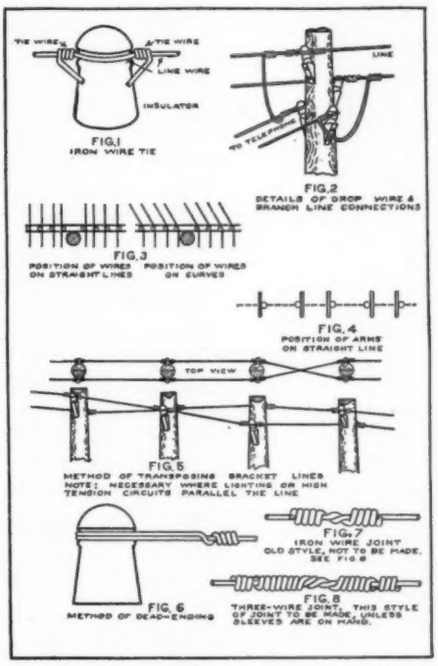
A few suggestions on rural line construction are given in this article. For detail description of construction methods those interested should consult telephone books and bulletins of telephone manufacturing companies.

First of all, obtain a map of the county in which the proposed line is to be constructed, and indicate thereon the location of the subscribers and the prospects. If unable to get a map locally, a negative print of a county map may be obtained by sending a 20-cent money order to the Third Assistant Postmaster, General Division of Finance, Washington, D. C. These maps are drawn to a scale of two inches per mile and show in addition to the sections, the roads and farmhouses.

Having indicated the location of the subscribers by means of a small circle or cross, drive over the territory and select a route for the main line and branch lines. The route should follow highways free from trees, marshes, paralleling high-tension leads and telephone leads. Railroad crossings should be avoided if possible on account of the required clearance over the tracks necessitating the setting of higher and heavier poles.

Having chosen the routes, jot down the number of poles, and their sizes required for each mile. Twenty-foot five-inch top poles comprise the size mostly used for a bracket or cross-arm line. To grade the line and obtain a clearance of 18 feet at highways and private driveways, the necessary number of 25-foot poles should be ordered.

A bracket line should consist of not less than 30 poles per mile; a 6-pin arm line, of at least 32 per mile, and a 10 or 12-pin arm line, of 36 poles per mile. In turning corners, the poles on each side of the corner should be set from 75 to 90 feet




**Graphic Instructions Regarding Line Work.**

apart in order to reduce the strain. Poles should be set from four to five feet deep, depending upon the soil. In back-filling the soil must be well tamped around the pole.

Poles of cross-arm lines should be set a little deeper at corners on account of the greater strain. Poles at railroad crossings should be double-armed and the poles spaced not more than 90 feet. The lowest wire crossing a railroad track must be at least 25 feet above the rails.

To prolong the life of poles, the roofs and gains should be treated with a coat of carbolineum or creosote oil. That part of the pole extending a foot above and a foot below the surface of the earth should also be treated.

Every eighth pole should be equipped with a lightning rod, consisting of a No. 9 iron wire stapled to the pole every two feet along the exposed portion and coiled around the butt of the pole. The wire should extend seven or eight inches above the top of the pole.

Brackets and arms should be attached to the poles before the pole is set. Brackets should be fastened by means of 20-penny and 40-penny spikes; one five inches from the top of the pole, the other on the other side 12 inches lower on the other side of the pole. No. 12 B. W. G. gauge B. B. double galvanized iron wire is the most suitable wire for rural circuits. One circuit mile weighs 330 pounds. It is furnished in coils weighing 83 pounds.

Make all connections with steel joints.

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## Seventy-Mile Toll Circuit Under Way by Texas Company.

The Kerrville Telephone Co., Kerrville, Tex., through its general manager, D. H. Comparette, recently placed an order for material to string a copper metallic toll circuit between Kerrville and Rock Springs, a distance of 70 miles.

The latter point is the named distance from a railroad, of which Kerrville is the terminal. That and all intervening points are served by freight wagons and trucks and "Star Route" stage. The most important intervening interests are numerous large ranches which have been served with wire communication for several years by bridging to the grounded iron toll circuit which was established some years back.

It can be readily seen that the service rendered toll and local subscribers was not entirely satisfactory, though better than might be expected. The installation of the proposed circuit will give the ranchmen and oil interests connections with points as far as Kansas City, St. Louis and Chicago, as the Kerrville company, though Independent, has very satisfactory working relations with the Southwestern Bell. In fact, Mr. Comparette informed the writer that the Bell company has always met him half way where mutual interests have been involved.

Those of you with conditions on the edge of civilization, so to speak, may consider the installation of 70 miles of copper an everyday job. The writer has inspected many miles of line in various parts of the country, but for consistent irregularity of the earth's surface, this particular route outpoints any that has yet come under his observation. In ups and downs and turns and twists, nothing in Colorado or Utah is quite equal to it. This undesirable feature is offset by the fact that it is not subjects to the severe storm tests of the North.

The circuit will be strung on pins Nos. 1 and 3 of the present six-pin arm and the grounded circuit transferred to pin No. 6. The present iron circuit will be maintained for emergency use and continue to serve as a rural line to subscribers along the route.

Mr. Comparette is a thoroughly enterprising telephone man as will be judged by this following incident: The writer

received his copy of TELEPHONY several months ago and noting an article which he thought might be of interest to Mr. C., gave him the copy. A few weeks later he handed him a later copy, but was advised, with due appreciation, that so much good "stuff" had been found in the first copy a subscription had been forwarded at once.

The truth is, TELEPHONY strikes home.

## Telephone Traffic Formulas.

By Irnolph Erichsen.

The formulas given below are an outcome of the author's work on traffic studies in the traffic department of the United River Plate Telephone Co., Ltd., Buenos Aires, Argentine, South America. They are based upon pure theoretical considerations and have given good results when applied in practice.

1. To calculate the carrying capacity required of a group of toll lines in order to provide a certain standard service:

$$c = \frac{30\,(m + 2a)}{30 + d}$$

$c$ = number of calls which the group must be able to carry in one hour.
$m$ = number of toll orders received during the busy hour.
$a$ = number of toll orders made previous to the busy hour and still pending communication at the commencement of this.
$d$ = average delay expected of the $m$ calls.

Once the carrying capacity required has been found, it is an easy matter to determine the number of lines necessary, knowing the average holding time.

2. Formula for calculating the number of trunk lines required for a given number of calls in the busy hour:

$$T = \frac{2 \times d \times c}{100} + n$$

$T$ = number of trunks required.
$d$ = average holding time in minutes.
$c$ = number of calls in the busy hour.
$n$ is a varying factor, having the following values:

| | |
|---|---|
| $c > 400$ | $n = 5$ |
| $400 > c > 200$ | $n = 4$ |
| $200 > c > 200$ | $n = 4$ |
| $100 > c > 50$ | $n = 2$ |
| $50 > c > 30$ | $n = 1.5$ |
| $30 > c > 10$ | $n = 1$ |

The probability of "trunks engaged" will be 4 per cent; this does not apply in the case of small trunk groups.

3. Estimating trunk traffic:

An exchange $M$ with $A$ subscribers (exchange lines) makes $m$ calls to another exchange $N$ with $B$ subscribers.

How many calls will exchange $M$ make to exchange $N$ at a certain future date, when it is estimated that exchange $M$ has had an increase of $a$ subscribers and exchange $N$ of $b$ subscribers?

$$x = \frac{m \times (A + a) \times (B + b)}{A \times B}$$

4. Estimating local traffic:

An exchange with $A$ subscribers is making $m$ local calls.

How many local calls will be made in the exchange when the number of subscribers has increased with $a$?

$$x = m\left(\frac{A + a}{A}\right)^2$$

5. Estimating originating traffic:

An exchange with $A$ subscribers originates a total of $(m + n)$ calls, of which $m$ are local calls and $n$ outgoing trunk calls to the other exchanges in the area, these having a total of $T$ subscribers.

How many originating calls will be made at a certain date when the $A$ subscribers have increased with $a$ and the $T$ subscribers with $t$ new subscribers?

$$x = \frac{A + a}{A}\left[m\left(\frac{A + a}{A}\right) + n\left(\frac{T + t}{T}\right)\right]$$

6. Estimating the date of exhaustion of "B" positions:

An exchange with $A$ subscribers makes $m$ calls to $B$ subscribers in another exchange.

What has been the increase in the number of subscribers in the two exchanges, when the $m$ calls have increased to a total of $n$ calls (maximum load on "B" positions at the incoming exchange), knowing that in the outgoing exchange the number of subscribers increases at a rate of $R_a$ and in the incoming exchange at a rate of $R_b$?

Increase at the outgoing exchange:

$$a = \frac{A}{2R_a} \times \left[\sqrt{(R_a + R_b)^2 + 4R_aR_b\left(\frac{n}{m} - 1\right)} - (R_a - R_b)\right]$$

Increase at the incoming exchange:

$$b = \frac{a \times B \times R_b}{A \times R_a}$$

When the increase in the number of subscribers at the two exchanges has been calculated, the curves of development of subscribers will indicate the date when that increase has taken place.

7. An exchange with $A$ subscribers makes $m$ local calls. The exchange is divided into two, the new exchange having $a$ subscribers.

How many local calls will be made in the exchange remaining with $(A-a)$ subscribers, and how many in the new exchange?

How many calls will the exchange with $(A-a)$ subscribers make to the exchange with $a$ subscribers and vice-versa?

Local calls in the exchange with $(A-a)$ subscribers $= m\left(\frac{A-a}{A}\right)^2$

Local calls in the exchanges with $a$ subscribers $= m\left(\frac{a}{A}\right)^2$

Calls made by the $(A-a)$ subscribers to the $a$ subscribers and vice-versa $= m\frac{(A-a)\ a}{A^2}$

## Why the Telephone Subscriber Couldn't Get Central.

A Lonoke, Ark., subscriber walked into the telephone exchange one morning and expressed himself loud and long regarding the service at his station. He could talk over his clothes line, he said, with as much satisfaction as he could his telephone line. He had sought that morning to place an important call and his telephone was dead as Julius Caesar's ox. After wearing himself out shouting into a deaf and dumb instrument he had gone to his neighbors' house and found a live wire and a prompt and pleasant operator.

"Why," he demanded, in rasping accents and with violent gestures, "can I talk over my neighbor's line and yet am denied service on my own?"

Why, indeed, the manager could not understand, unless something had happened to the inside wiring. He himself went with the subscriber to his home and found his wires and connection O. K. But when he came to inspect the instrument he threw back his head and started to indulge in the laugh of a lifetime. Then he thought of the feelings of the subscriber and put his hand over his mouth and nearly choked.

There was a laundry bag hanging by the loop of its cord to the receiver hook. Of course when the receiver was lifted, the hook still stayed down and it had no more effect in getting the attention of the operator than if the subscriber had turned the knob of the door.

The subscriber glared at the manager with astonishment and the latter merely pointed to the laundry bag hanging serenely on the hook. The subscriber took one look and then he offered to sell himself and his house and all his future prospects, lock, stock and barrel, to the manager for a dime.—Southwestern Telephone News.

## To Construct New Telephone Line to Sheridan, Wyo.

The Mountain States Telephone & Telegraph Co. will soon commence the construction of a new telephone line from Billings, Mont., through Hardin, to Sheridan, Wyo.

The line will probably connect at Pompeys Pillar with the line down the Yellowstone valley and from there run direct to Hardin, a distance of approximately 30 miles, possibly touching at Toluca. From Hardin the line will run up the Little Horn valley, taking in all stations to Sheridan, Wyo.

The building of this new line will relieve the congestion in the office at Hardin, as the new line running down the Big Horn valley to Custer will still be maintained, thus dividing the business between two lines, whereas at the present time it all has to go over one line.

# Argus LIGHTNING ARRESTERS never fail!

By their extensive use among telephone, telegraph, and railroad companies, Argus arresters have proved their dependability.

Argus lightning arresters invariably prevent lightning trouble.

So economical that no telephone company should be without them.

Be prepared for spring and summer storms. Equip with them now.

**Foote Pierson & Company, Inc.**
**160 DUANE ST., NEW YORK CITY**

# CONDENSERS

**Mansbridge Type Condensers are Self-Sealing and cannot be internally short-circuited. If one is broken down by a lightning or high-tension discharge, or by mechanical damage, it automatically and instantaneously seals up, this being the unique and characteristic property of the metallized paper.**

**You can drive a pin right through a Mansbridge Condenser and the capacity and insulation will still be O. K.! Sounds impossible, but it's solid fact!**

## Complete Satisfaction

**That's the reason why the Mansbridge Condenser has made good.**

**Mansbridge Condensers are More Reliable, Lighter, Smaller and no more Costly than those of the old fashioned solid foil type.**

**They are made under license by Western Electric Company, Ericsson Mfg. Co., Electric Specialty Co., Stromberg-Carlson Co., American Electric Co., and by numerous other licensees all over the world.**

**Insist upon having MANSBRIDGE CONDENSERS.**

**For full particulars and for terms of manufacturing license in U. S. A. and Canada apply:**

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**Mount House, New Barnet, England**

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Are **highly** important. "Highly" in two senses of the word, both literally and figuratively. Klein belts, safety straps and climber straps are trustworthy and that means a **good deal.** (And you can interpret that in two ways also.)

Don't overlook our tool bag for your men. It's "built for the job," and a very handy outfit. If unable to get Klein goods from nearest dealer, write us direct. Catalog mailed on request.

**MATHIAS KLEIN & SONS, Mfrs.**
**Canal Station 34** **CHICAGO**

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

# From Factory and Salesroom

Conventions: Indiana, Indianapolis, Sept. 16-18; Missouri, Jefferson City, Sept. 16-17; Illinois, Nov. 11-13

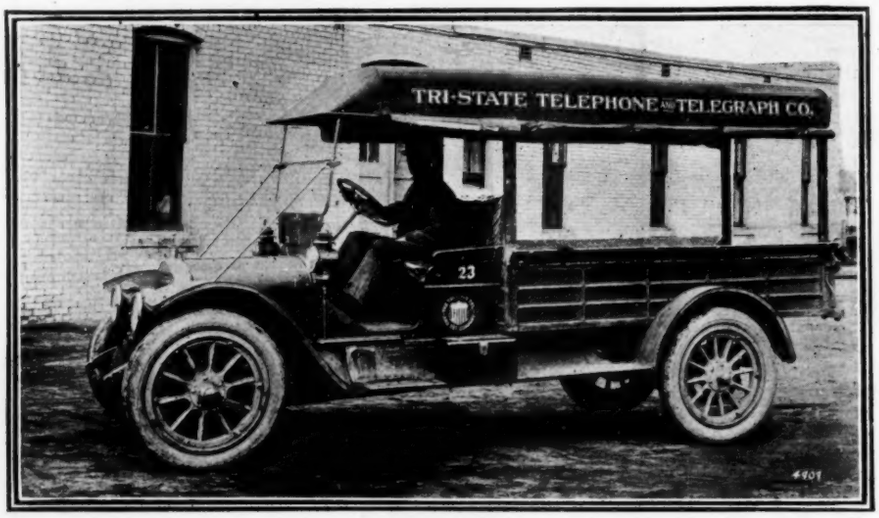
### Life of Motor Truck Based on Mileage, Not Years.

How long should a good motor truck last?

In the light of present-day motor truck development, that question, pertinent as it always has been and always will be to the truck owner and prospective owner, must be revised to read:

How far will a good truck run?

Miles-old is the true measure of the aggregate of a truck's service. Due to differences in the needs of business, it is possible for one truck to travel six or eight or ten times as far as another in the same time—although both operate efficiently.




White Truck Owned by the Tri-State Telephone & Telegraph Co., of St. Paul, Minn., Has Traveled More Than 200,000 Miles.

In all kinds of service and under all sorts of conditions, White trucks are demonstrating that the total of a truck's service must be gauged not in age but in mileage. So many Whites have covered more than 100,000 miles each, for instance, that that mileage, once considered a remarkable achievement, has become a commonplace performance.

In some instances White trucks have so far exceeded 100,000 miles—and kept right on running—that their records border on the spectacular. For instance, a White, equipped with a passenger-carrying body and owned by Alexander & Walling, of Fresno, Calif., has traveled 500,000—half a million miles. This mileage was made, of course, in a service calling for daily runs longer than are required of trucks in ordinary service; and it is to ordinary service that the greater interest attaches.

At random from an extensive list of White trucks that are known to have covered more than 100,000 miles, there have been selected the following specific instances of trucks in ordinary service:

Two White trucks owned by Armour & Co., and in service in Spokane, Wash., have traveled more than 100,000 miles each. A White truck owned by the East Ohio Gas Co. of Cleveland, Ohio, has covered more than 100,000 miles; another owned by the Los Angeles Gas & Electric Corp. of Los Angeles, Calif., has gone 131,728 miles; and another owned by the Tri-State Telephone & Telegraph Co. of St. Paul, Minn., has topped 200,000 miles.

In the strenuous service of newspaper publishing companies, Whites have rolled up goodly mileage. The Memphis News-Scimitar, of Memphis, Tenn., and the St. Paul Daily News, of St. Paul, Minn., each own a White truck that has passed the 100,000-mile mark; and another owned by the Montreal Gazette, of Montreal, Que., has 140,000 miles to its credit.

Laundry delivery service, with its many stops and starts, may be considered as well calculated to test the stamina and the endurance of any truck. A White truck has covered more than 300,000 miles for Wouters' Laundry, Chicago. Another owned by the Westfield Laundry, of Westfield, Mass., has run 200,000 miles. The Waltham Laundry, of Waltham, Mass., owns two Whites that have covered more than 100,000 miles each.

One-truck, or even two-truck installations with mileages over 100,000 might appear sporadic—were it not for the fact that they intersperse installations of Whites in which whole fleets have similar records.

Three White trucks owned by the Telling-Belle-Vernon Co., of Cleveland, manufacturer of ice cream, have run over 100,000 miles each. Bullock's Department Store, in Los Angeles, Calif., owns five Whites that have gone over 100,000 miles each. The Emerick Bus Line Co., of Bellefont, Pa., and Madary's Planing Mill, of Fresno, Calif., each have six-unit White fleets with mileages of 120,000 to 150,000 miles for each truck. Seven White trucks owned by Sterling & Welch, Cleveland furniture dealers, have mileage records ranging from 101,250 to 139,250.

In the big fleet of White trucks owned by the White Transit Co., of Plymouth, Pa., are 15 units with mileages between 132,400 and 242,200.

In the service of Gimbel Brothers' New York store is a fleet of 25 Whites, each of which has passed the 100,000-mile mark.

The Bradford Baking Co., of Los Angeles, Calif., owns 26 White trucks whose mileages average 102,184 each.

It is to be remembered that the instances herein cited are simply typical cases, selected from among many. There has been no effort here even to indicate the variety of lines of service in which White trucks are attaining big mileages. As a matter of actual record, White trucks are known to have exceeded 100,000 miles in services that take in 49 lines of business.

How far should a good truck run?

That question cannot be answered yet, for the White trucks that are answering it are still running.

---

### The Testing of Vacuum Lightning Arresters.

The L. S. Brach Mfg. Co., Newark, N. J., has received many requests as to methods of testing vacuum arresters.

Vacuum arresters may be tested by connecting the arresters to the secondary of any spark coil, as, for instance, taking one of the leaves of a spark plug of an automobile or a motorcycle to the frame of the machine. A good vacuum is shown by a violet or bluish glow. Lost vacuum will be shown by straight-line sparking, such as would be seen on the spark plug points in the open air. In order to see the violet glow, however, it is necessary to shield the arrester from sunlight.

In the latest arrester of the L. S. Brach Mfg. Co., mechanical features have been so well taken care of, that the company is able to guarantee the vacuum for a period of two years. The vacuum should, the company states, last many

## The NEW PERFECTION SOLDERER
### designed especially for telephone work

The invention of a telephone man of twenty years' experience who realized that the soldering requirements of the telephone field called for a more adaptable tool than was to be had.

The New Perfection Solderer is intended for both inside and outside work. It can be gotten into places where a blow torch cannot be used. Will not burn insulation. Will solder line joints on either iron or copper wire and do a perfect job each time.

*Write today for full particulars.*

**THE BELL SPECIALTY CO.**
**Chester, S. C., U. S. A.**

**As an instance of simplicity- note that one "PRATT System" book takes the place of 4 complicated forms**

This alone is of sufficient importance to justify your using the PRATT book-keeping system.

Think of the time and trouble you can save. In a busy telephone exchange where minutes are actually sold to the public, a simple, efficient, and compact telephone system such as the PRATT system is, should have your favorable consideration.

The PRATT system was especially designed and perfected for telephone service by telephone men, and is in successful use by many telephone exchanges.

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An inquiry will bring you interesting information.

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**PUBLIC ACCOUNTANTS AND AUDITORS**
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**Every exchange should have them**

**Pignolet Volt-meters and Volt-ammeters are highly regarded for their workmanship and quality.**

**Every exchange should have them because they will measure resistances and locate trouble quickly in addition to measuring current. Moderately priced.**

***Literature on request.***

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# PIGNOLET
## VOLT METERS
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**Metallic Circuit Protection** — **Economy of Space**

# VAC-M No. 5 Lightning Arrester

Embodies all the efficiency for which the larger VAC-M arresters are so well known, yet is only $1\frac{3}{8}''$ wide and 6″ long.

**Write for VAC-M literature**

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**303 Terminal Bldg.,**
**Toledo, O.**

years in ordinary service, as in the case of an electric lamp. The only fear of breakage is due to malicious or accidental damage, in which case it is very rare, as the new types may be dropped without fear of damage.

## New Stromberg-Carlson Test Set for Small Exchanges.

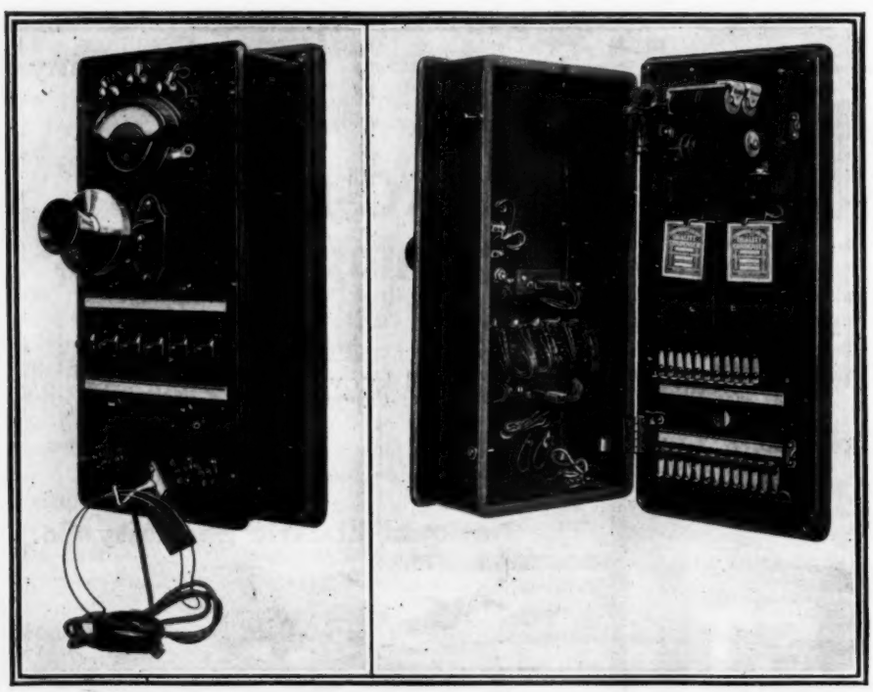
Anyone who has been associated with a small rural telephone company will agree that there is room for improvement in the methods employed by such systems in the handling of routine maintenance and inspection work. Usually the revenue of such companies does not permit the employment of more than one or two real telephone men so that the need for increased effectiveness in the performance of maintenance work is vitally essential to the proper management and operation of the plant.

One of the first steps towards increased economy of maintenance, time, and materials is the installation of an adequate testing equipment at the central office whereby the nature and approximate locations of faults in lines or apparatus may be determined quickly and easily. This equipment reduces the clearing of "troubles" to a scientific basis and enables the inspector or troubleman to make every move count. As a result the maintenance staff can clean up the day's trouble sheet in less time and at less cost and to the greater satisfaction of the subscribers.

Realizing the need for a small and relatively low-priced wire-chief's testing equipment for small exchanges, the Stromberg-Carlson Telephone Mfg. Co., of Rochester, N. Y., has developed and is now selling the apparatus shown in the accompanying illustrations. The equipment consists of a neatly designed and finished quarter-sawed oak cabinet within which all of the operating parts are mounted. Its equipment includes a telephone set with head band receiver, removable testing voltmeter and a complete set of testing keys.

This apparatus, its manufacturers assert, will makes the following tests on telephone line—tests for open circuits, short circuits, grounds, crosses with power lines, crosses with other telephone lines, and measurements of resistance and voltage of batteries.

Testing sets of this type are made for use with magneto and central energy systems. Further information regarding these instruments may be obtained from any office or sales representative of the Stromberg-Carlson company.



Closed and Open Views of New Wire Chief's Testing Equipment.

## L. V. Estes, Inc., Establishes Appraisal Department.

Chas. W. McKay, for some time appraisal engineer for the industrial engineering firm of Cooley & Marvin Co., Boston, Mass., is now head of the newly organized appraisal department of L. V. Estes, Inc., of Chicago. In this capacity he is prepared to make appraisals and valuations of Independent telephone properties.

Mr. McKay needs no introduction to TELEPHONY's readers who are well acquainted with him as author of "Telephone Engineering Economics" of the series on "The Fundamental Principles of the Telephone Business," now appearing in TELEPHONY and the section on "The Valuation of Telephone Properties" published during 1917 and the early part of 1918 and now in book form.

Telephone engineering and appraisal work has been specialized in by Mr. McKay since graduation from Cornell University in 1906 with a degree of M. E. After several years of varied experience in appraisal work with the New York & New Jersey Telephone Co., when that company, together with all of the upstate Bell companies, was absorbed by the New York Telephone Co., Mr. McKay was assigned to special work for the consolidated company, inspecting a number of the newly-acquired properties, making plans for cut-overs, etc. In 1911 he was stationed at the company's headquarters in New York, subsequently being appointed engineer for the borough of Queens.

Chas. W. McKay, Who Is in Charge of the Newly-Organized Appraisal Department of L. V. Estes, Inc., of Chicago.

Severing his connections with the New York Telephone Co. early in 1912, Mr. McKay was for a time associated with Henry Floy in the capacity of assistant engineer. In the summer of 1913 he became engineer to the McCall & Clark Co., efficiency experts of New York, and in October of that year he affiliated himself with McMeen & Miller of Chicago. The major portion of Mr. McKay's time with this well known firm was spent on problems involving the appraisement of telephone properties. After leaving the employ of McMeen & Miller he was associated with the Central Union Telephone Co. in valuation work. He later accepted the appointment as appraisal engineer for Cooley & Marvin, as mentioned previously.

## New Stromberg-Carlson Toll Board for Greenville, Ohio.

The Greenville Home Telephone Co. has closed a contract with the Stromberg-Carlson Telephone Mfg. Co., of Roches-

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Pass three inspectors

**Page & Hill Co.**

Minneapolis Chicago New York Kansas City Houston

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*NORTHERN or WESTERN*

*Plain or Butt Treated*

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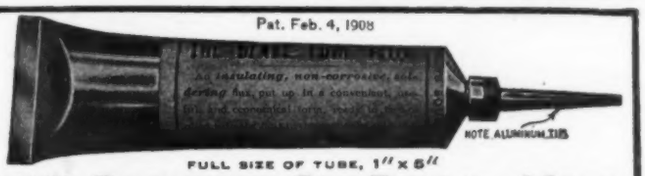


**Blake Signal & Mfg. Co.,** Write for Samples **251 Causeway St., Boston, Mass.**

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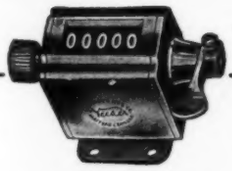


*Counts the Calls*

This small set-back Rachet Counter registers one for each press of the thumb lever. Instantly set back to zero by one turn of knob. Send for booklet giving complete description of models.

Keeping count of calls handled daily means *keeping informed on traffic tendencies*—keeping ahead of *service* requirements.

Veeder

Counters—attached to the keyboards—enable you to take periodic counts, give you data for forehanded management and show you the volume handled by each operator.

**Veeder Mfg. Co.,** 11 Sargeant St., Hartford, Conn.

---

ter, N. Y., for a new four-position lamp signal multiple toll board and for the associated terminal and protector equipment, to be installed in its exchange in Greenville, Ohio. Equipment for immediate operation will include complete facilities for handling 40 toll lines, 20 pay-station lines and 20 percentage multiple lines.

### Western Manager for Sale of Matthews Specialities.

James R. Kearney, who for the past 14 years has been connected with W. N. Matthews & Brother, of St. Louis, Mo., has just been made Western manager of the line material division of that company, with headquarters in Chicago.

His territory will cover all of the United States west of Pittsburgh and Canada from Winnipeg west.

His duties will be to supervise the line material division sales and to be in charge of all salesmen traveling that territory.

### Paragraphs.

U. G. POWELL, for the last 12 years rate expert with the Nebraska State Railway Commission, has resigned, to take effect at the pleasure of the board, and will enter private practice as an accountant and rate expert.

Mr. Powell is one of the best known experts in the country, and has appeared in a large number of cases. He is the author of an accounting system for telephone companies which the commission is now installing in Nebraska, and is as expert in telephone matters as in railroad cases.

### New Factory Building for Belden Mfg. Co. in Chicago.

The Belden Mfg. Co., 2300 South Western avenue, Chicago, recently let contracts for the erection of a new four-story factory building at its new plant location at Kilpatrick avenue and West Congress street, Chicago.

This will make the third building erected by the company on this tract of land. The erection of five more buildings is contemplated in the next few years.

The new building will be used for expansion of the different magnet wire departments.

### Blue Jays Defend Home Against Telephone Men.

The construction force of the Ashland Home Telephone Co., of Ashland, Wis., was held up half a day on July 19, and work was delayed for hours, by two militant blue jays, who defended their home against the combined forces of the telephone company, and the police department.

Two employes of the Home company, Tom Kennedy and Elmer England, were detailed to install a telephone on Seventh avenue east, which required that one of them should climb a telephone pole to make the connection. On their first attempt they were savagely attacked by a blue jay, which was guarding a nest at the top of the pole. Repeated efforts to climb the pole, brought no better results, the mother blue jay, reinforced by her mate, attacking the linemen every time they attempted to ascend the pole.

Both linemen made repeated efforts, receiving cuts on their faces and hands, until they were finally forced to retreat. They obtained permission from Chief of Police Blair to shoot one of the birds, and on capturing the nest, found that it contained three young blue jays, and a young sparrow, the latter nearly full grown. The four birds are now being reared in the telephone office.

### Patrons to Express Preference for Automatic or Manual.

Dallas (Tex.) telephone subscribers were given an opportunity to decide by postcard vote from August 6 to August 12, whether they desire an automatic system throughout or prefer the manual system.

These cards were sent out by the mayor as a result of a proposal filed by the Dallas Telephone Co. that all manual telephone instruments now in use be replaced with automatic instruments.


Burns

TELEPHONE BRACKETS

MONEY MAKERS FOR YOU

Furnish subscribers with these conveniences. Quickens service, saves cordage, prevents breakage, adds to income. Best made and most widely used.

Attractive Prices to Exchanges

MANUFACTURERS

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